NASA
National Aeronautics and
Space Administration

STS-5
Fifth Space Shuttle Mission

First Operational Flight

Press Kit

October 1982

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NASA News

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STS-5 FEATURES LAUNCH OF TWO COMMERCIAL SATELLITES AND SPACE WALK

The fifth flight of the Space Shuttle marks the first operational use of the nation's Space Transportation System. Spaceship Columbia's first operational job will be to haul two commercial communications satellites -- Satellite Business System's SBS-3 and Telesat Canada's Anik C-3 into orbit.

Designated STS-5, the fifth Shuttle mission is scheduled for launch on Nov. 11, 1982 from Complex 39's Pad A at NASA's Kennedy Space Center, Fla. Launch of STS-5 is set for 7:19 a.m. EST.

Significant "firsts" for Columbia on STS-5 will include:

* First Space Shuttle flight to carry and deploy commercial satellites into space.

* First flight with a crew of four astronauts.

* First flight of Mission Specialists aboard the Space Shuttle.

* First planned "space walk" to demonstrate the Extravehicular Mobility Units.

The flight crew for STS-5 is comprised of Commander Vance Brand, 51, and Robert Overmyer, 46, pilot. Mission specialists are Dr. William B. Lenoir, 43, and Dr. Joseph Allen, 45.

October 22, 1982

-more-

As part of their chores, the mission specialists will perform the first Extravehicular Activity (EVA) ever attempted on a Shuttle flight. The two mission specialists will go out together into the Columbia's cargo bay where they will spend more than three hours testing their space suits' cooling and communications systems, and practicing procedures that may be used to repair an orbiting satellite, conduct a space walk to close balky bay doors or repair thermal protection tiles on the orbiter's exterior.

Columbia will be launched into a 185-statute-mile (160 nautical-mile) circular orbit above the earth with an inclination to the equator of 28.5 degrees. Space Shuttle main engines will be run at 100 percent of their rated power level.

The launch window will open at 7:19 a.m. and close at 7:59 a.m. EST. The shortness of the window is due to daylight landing constraints at Edwards Air Force Base, Calif., as well as contingency landing sites, and to obtain the proper sun angle for the two commercial satellites after they are deployed and relying on their solar cells for electrical power.

Mission duration is 5 days, 2 hours and 9 minutes, with landing to occur on Nov. 16 at 9:27 a.m. EST. Columbia will again aim for a lakebed landing at Edwards Air Force Base.

The principal cargo to be carried on STS-5 is two commercial communications satellites. Other items to be carried in the cargo bay will be a Getaway Special (GAS) canister and the Development Flight Instrumentation (DFI) package. Experiments scheduled to fly in the orbiter's mid-deck include three Shuttle Student Involvement Project experiments. The Remote Manipulator Arm has been removed for STS-5.

Satellite Business Systems' SBS-3 is the third in a series of business communications satellites, while Telesat Canada's Anik C-3 is the fifth of a series of satellites that provides domestic communications services for Canada.

-more-

STS-5 will mark the first use of the Shuttle Payload Assist Module, PAM-D, and a new ejection system. A modified version of the Payload Assist Module has been used as the third stage of NASA's Delta rocket to propel a variety of satellites to geosynchronous altitude.

SBS-3 will be the first spacecraft launched out of the cargo bay. It will be deployed on the sixth orbit, about eight hours after liftoff, when the orbiter is over the Atlantic Ocean. The Anik C-3 spacecraft will be released on the second day of the mission, on about orbit 22, while Columbia is over the Pacific Ocean near Hawaii.

At the beginning of their fourth day in orbit, Allen and Lenoir will don pressure suits -- Extravehicular Mobility Units (EMU) -- and backpacks with portable life support systems to perform the extravehicular activity.

They will inspect the cargo bay and then move to a stationary tool box and remove a mini work station that will tether them at various worksites.

In view of the payload bay cameras, they will test stationary and portable foot restraints, torque and box wrenches, scissors, cutters and ratchet tools to be used on future flights. They will also test two winches mounted on the forward and aft bulkheads.

The Getaway Special experiment will use X-ray recordings to investigate the behavior of metallic dispersions. It is the first in a series of material science experiments conducted by the German Ministry of Research and Technology.

Columbia will operate in several different attitudes during the 122-hour flight to obtain additional information on the thermal characteristics of the spacecraft.

During the mission, Columbia will spend about 40 hours with its side turned to the sun, and another 20 hours facing the sun with its nose propped up about 10 degrees and about 10 hours rolling wing-over-wing in a barbecue fashion known as Passive Thermal Control mode.

This maneuver is performed for short periods of time throughout the mission to even out temperatures over the entire spaceship.

As a result of the STS-4 solid rocket boosters' deceleration system failure, on this mission the parachute disconnect-at-water-impact feature has been removed. The feature was intended to prevent the possibility of partially inflated parachute canopies dragging the boosters through the water after impact. It was active on STS-1, 2 and 3 but was partially removed for STS-4. For that flight the frangible nuts holding one of two risers for each main parachute were replaced by regular, solid nuts which would not separate that riser. For STS-5 the remaining frangible nuts will be replaced with solid hardware. As a result, both risers on each parachute will now remain attached to the boosters until they can be detached by the retrieval crew.

Entry will follow the same course in returning from orbit as did earlier STS missions: retrofire over the Indian Ocean, atmosphere entry over the western Pacific Ocean, transition to aerodynamic controls in the atmosphere and the landing as an aircraft.

Plans call for the first attempt at a fully automated landing of the orbiter on the dry lakebed at Edwards Air Force Base. The crew will closely monitor the "hands off" approach and landing and be ready to take over manual control, if necessary. The chance for a crosswind landing, a desired landing mode, is not likely due to the calm wind conditions expected in the early morning hours.

(END OF GENERAL RELEASE; BACKGROUND INFORMATION FOLLOWS.)

STS-5 PRESS BRIEFING SCHEDULE

Date	Time EST	Time CST	Time PST	Event	Origin
T-2	9:00 a.m.	8:00 a.m.	6:00 a.m.	STS-5 Countdown Status	KSC
	10:00 a.m.	9:00 a.m.	7:00 a.m.	Flight Plan & EVA	KSC
	1:00 p.m.	12:00 p.m.	10:00 a.m.	SBS-3/Anik C-3 and Experiments	KSC
T-1	9:00 a.m.	8:00 a.m.	6:00 a.m.	Countdown Status	KSC
	10:30 a.m.	9:30 a.m.	7:30 a.m.	Prelaunch Press Conference	KSC
T-0	(Approximately 90 minutes after launch)			Post Launch Press Conference (KSC only)	KSC
T thru T+5	See TV Schedule			Flight Director's Change of Shift Briefings	JSC
T+6	(approximately 2 hours after landing)			Post Landing Briefing	DFRF
T+7	2:00 p.m.	1:00 p.m.	11:00 a.m.	Orbiter Status Briefing	DFRF

JSC NASA SELECT TELEVISION SCHEDULE for STS-5
REVISED 10/18/82

*****---------------------- PRELAUNCH ACTIVITES -------------------------*****

		EST
T MINUS 2 DAYS	- Countdown Status Briefing from KSC	9:00 AM
	- Flight Plan/EVA Briefing	10:00 AM
	- SBS/Anik/Experiments Briefing	1:00 PM
T MINUS 1 DAY	- Countdown Status Briefing from KSC	9:00 AM
	- Prelaunch Press Conference from KSC	10:30 AM

--------------------------- Thursday, November 11 ---------------------------

ORBIT	SUBJECT	MET (DD/HH:MM)	EST
	LAUNCH		7:19 AM
	OTV LAUNCH VIDEO from KSC	00/00:45-01:00	7:04 AM
2	GROUND CONTROLLED PAYLOAD BAY TV (MIL) T=9:04	00/01:36-01:45	8:55 AM
2	PLAYBACK of GROUND CONTROLLED PAYLOAD BAY TV	00/01:56	9:15 AM
4	SHIFT BRIEFING-ASCENT/ENTRY TOMMY HOLLOWAY-FLIGHT DIRECTOR	00/05:00	12:20 PM
6	TV01 SBS PRE-DEPLOY ACTIVITIES (HAW) T=8:08	00/07:41-07:49	3:00 PM
6	PLAYBACK of TV01 SBS PRE-DEPLOY ACTIVITIES	00/08:01	3:20 PM
7	TV01 VTR DUMP of SBS DEPLOY (HAW) T=7:41	00/09:17	4:36 PM
7	PLAYBACK of SBS DEPLOY	00/09:36	4:55 PM
9	SHIFT BRIEFING-ORBIT JOHN COX-FLIGHT DIRECTOR	00/12:30	7:50 PM

-more-

---------------------------- Friday, November 12 ----------------------------

14	SHIFT BRIEFING-PLANNING GARY COEN-FLIGHT DIRECTOR		00/20:30	3:50 AM
19	SHIFT BRIEFING-ACSENT/ENTRY TOMMY HOLLOWAY-FLIGHT DIRECTOR		01/03:30	10:50 AM
22	TV02 ANIK PRE-DEPLOY ACTIVITIES T=8:12	(HAW)	01/07:50	3:09 PM
22	PLAYBACK of ANIK PRE-DEPLOY ACTIVITIES		01/08:11	3:30 PM
24	SHIFT BRIEFING-ORBIT JOHN COX-FLIGHT DIRECTOR		01/11:30	6:50 PM

---------------------------- Saturday, November 13 ----------------------------

30	SHIFT BRIEFING-PLANNING GARY COEN-FLIGHT DIRECTOR		01/19:30	2:50 AM
32	TV02 VTR DUMP of ANIK DEPLOY T=2:49/6:33	(GDS) (MIL)	01/22:38 /22:42	5:57 AM
32	PLAYBACK of ANIK DEPLOY		01/23:01	6:20 AM
34	SHIFT BRIEFING-ASCENT/ENTRY TOMMY HOLLOWAY- FLIGHT DIRECTOR		02/02:30	9:50 AM
38	WATER DUMP/AIRLOCK EQUIPMENT PREP T=7:56	(HAW)	02/08:00	3:19 PM
38	PLAYBACK of AIRLOCK EQUIPMENT PREPARATION		02/08:21	3:40 PM
39	SHIFT BRIEFING-ORBIT JOHN COX-FLIGHT DIRECTOR		02/10:00	5:20 PM

---------------------------- Sunday, November 14 ----------------------------

46	SHIFT BRIEFING-PLANNING GARY COEN-FLIGHT DIRECTOR		02/20:30	3:50 AM
49	TV05 EVA SCHEDULED TIME of EGRESS T=6:19/8:41	(GDS) (MIL)	03/00:20 /00:27	7:39 AM
49	PLAYBACK Of EVA from ORBIT 49		03/00:46	8:05 AM

-more-

50	TV05 EVA	(HAW) (GDS) (MIL)	03/01:44 /01:55 /02:04	9:03 AM
	T=8:04/5:56/6:04			
50	PLAYBACK of TV05 EVA		03/02:21	9:40 AM
51	TV05 EVA	(HAW) (GDS)	03/03:20 /03:31	10:39 AM
	T=7:34/3:49			
51	PLAYBACK of TV05 EVA		03/03:46	11:05 AM
53	SHIFT BRIEFING-ASCENT/ENTRY TOMMY HOLLOWAY-FLIGHT DIRECTOR		03/05:45	1:05 PM
57	SHIFT BRIEFING-ORBIT JOHN COX-FLIGHT DIRECTOR		03/11:30	6:50 PM

--------------------------- Monday, November 15 ----------------------------

62	SHIFT BRIEFING-PLANNING GARY COEN-FLIGHT DIRECTOR		03/19:00	2:20 AM
65	TV06 STUDENT EXPERIMENTS			
	FLUID CONVECTION in ZERO G	(HAW)	04/00:08	7:27 AM
	CRYSTAL GROWTH	(GDS)	/00:19	7:38 AM
	PORIFERA INTERCELLULAR COMMUNICATONS	(MIL)	/00:26	7:45 AM
	T=7:49/5:48/8:11			
65	PLAYBACK of TV06 STUDENT EXPERIMENTS		04/00:46	8:05 AM
66	SHIFT BRIEFING-ASCENT/ENTRY TOMMY HOLLOWAY-FLIGHT DIRECTOR		04/01:30	8:50 AM
72	SHIFT BRIEFING-ORBIT JOHN COX-FLIGHT DIRECTOR		04/10:00	5:20 PM

--------------------------- Tuesday, November 16 ----------------------------

79	SHIFT BRIEFING-PLANNING GARY COEN-FLIGHT DIRECTOR		04/19:30	2:50 AM
82	LANDING		05/02:09	9:28 AM

****----------------------- POST LANDING ACTIVITIES ----------------------****

LANDING plus APPROX. 2 Hours - Post Landing Briefing from DFRF

LANDING plus ONE Day - Orbiter Status Briefing from DFRF 2:00 PM

Definition of Terms

MET: Mission Elasped Time. The time which begins at the moment of launch. Read the clock by Days/Hours:Minutes.

CST: Central Standard Time.

ORBIT: The number of revolutions made by the spacecraft over a specific point on the Earth.

T=: Total time. In this case it will refer to the total time of the television pass.

EVA: Extravehicular Activity

Tracking Stations

GDS: Goldstone, California

HAW: Hawaii

MIL: Merritt Island Launch Area, Fla.

Payloads

SBS: Satellite Business Systems.

ANIK: A Telesat Ltd. of Canada owned satellite.

LAUNCH PREPARATIONS, COUNTDOWN AND LIFTOFF

The Shuttle Orbiter Columbia arrived at Kennedy Space Center from California atop its 747 jumbo carrier aircraft on July 15, the same day that stacking began on the twin solid rocket boosters that will help launch Columbia on its fifth flight.

The Satellite Business Systems' SBS-3 and Telesat Canada's Anik C-3 spacecraft both arrived by aircraft at the Skid Strip on Cape Canaveral Air Force Station on July 20.

Stacking of the twin solid rocket boosters on the deck of Mobile Launcher Platform-1 was completed on Aug. 16 and the massive 47-meter (154-foot) tall external tank was mated with the booster rockets on Aug. 20.

Modifications to Columbia in the processing hangar were primarily to support the first four-man crew and commercial satellites. The Remote Manipulator Arm and the Induced Environmental Contamination Monitor were taken out of the payload bay and the ejection seats were deactivated.

Columbia was moved to the Vehicle Assembly Building on Sept. 9 and was attached to its external tank and booster rockets on Sept. 10.

Another milestone achieved Sept.10 was the transfer of the Anik C-3 satellite from Area 60 to the Vertical Processing Facility where the individual satellites are integrated into a single Shuttle cargo.

A Shuttle Interface Test was conducted from Sept. 13-16 to verify the mechanical, fluid and electrical connections between the orbiter and its external tank and booster rockets. The test ended on Sept. 16 with a successful mock launch and reentry of the Shuttle with two of the four STS-5 crewmen - Commander Vance Brand and Pilot Robert Overmyer -- at the controls of the spaceship.

The Space Shuttle was moved to Pad A of Complex 39 on Sept. 21 to undergo final checkout and propellant servicing for launch. Pad to vehicle connections were completed on Sept. 22.

SBS-3 satellite was delivered to the Vertical Processing Facility Sept. 22.

A Terminal Countdown Demonstration Test with the STS-5 flight crew was conducted Sept. 24 to establish a timeline for activities involving the flight crew.

Integrated testing of the STS-5 cargo began Sept. 27 using special test equipment, called Cargo Integration Test Equipment, or CITE.

A series of CITE tests, lasting more than a week, was conducted to check orbiter-to-cargo interface points, simulate the deployment sequence and verify the communications link between the cargo and the Payload Operations Control Center in Houston.

An Integrated Cryogenic Loading Test was conducted on Sept. 28 to check the integrity of the external tank's outer insulation, verify the loading sequence and test the ability of Shuttle components to function properly in the super-cold environment. The No. 3 Auxiliary Power Unit that was replaced in the Orbiter Processing Facility was successfully test fired at the conclusion of the propellant loading test.

Preflight servicing of Columbia with hypergolic propellants was conducted from Oct. 5-8.

The STS-5 cargo was placed in an environmentally-controlled transport canister and taken to Pad A on Oct. 12.

Functional checks were run of each spacecraft in the Payload Changeout Room before the cargo was put inside Columbia's payload bay on Oct. 18. Electrical tests were conducted to make sure the cargo was properly connected to the orbiter, followed by interface checks with Mission Control and the Payload Operations Control Center.

Countdown preparations were scheduled to begin Oct. 29, leading to a pick up of the 100-hour Shuttle Launch Countdown on Nov. 7.

The launch countdown for STS-5 will be conducted from Firing Room 1 of the Launch Control Center by a government/industry team of about 200 persons.

The STS-5 launch countdown contains 80 hours of actual count time and 20 hours, 19 minutes of planned hold time.

The major change in the STS-5 countdown will be the later retraction of the protective Rotating Service Structure at the end of a planned 10 hour and 59 minute hold, or approximately 10 and one-half hours before liftoff.

The terminal portion of the countdown will start at the T-6 hour mark with the loading of cryogenic propellants into the external tank.

At T-9 minutes, the automatic ground launch sequencer will take command of the countdown, issuing critical commands and maintaining a cutoff capability until liftoff.

MAJOR COUNTDOWN MILESTONES

Count Time	Event
T-80 hours	Call to stations.
T-68 hours	Pressurize maneuvering and reaction control system propellant tanks.
T-40 hours	Load cryogenics into orbiter fuel cell supply tanks and pressurize.
T-34 hours	Eight-hour built-in-hold.
T-24 hours	Start external tank loading preparations.
T-17 hours	Perform interface check with Mission Control.
T-9 hours, 15 minutes	10-hour-59-minute built-in hold.
T-9 hours, 15 minutes (counting)	Retract Rotating Service Structure.
T-6 hours	Start cyrogenic propellant chilldown and load. Activate fuel cells and begin load sharing.
T-3 hours	1-hour built-in hold. Cryogenic load complete.
T-3 hours (holding)	Wake flight crew (Launch -4 hours, 10 minutes).
T-2 hours, 40 minutes	Suit flight crew (Launch -3 hours).
T-2 hours, 30 minutes	Crew departs for pad (Launch -2 hours, 50 minutes).
T-1 hour, 55 minutes	Start crew entry (Launch -2 hours, 15 minutes).
T-61 minutes	Inertial Measurement Unit begins preflight alignment.
T-20 minutes	10-minute built-in hold.
T-20 (holding)	Orbiter computers configure for launch.
T-9 minutes	10-minute built-in-hold. Status check and Launch Director "go."

T-9 minutes (counting)	Start ground launch sequencer.
T-7 minutes	Retract orbiter access arm.
T-5 minutes	Start Auxiliary Power Units. Arm range safety, solid rocket booster ignition systems.
T-3 minutes, 30 seconds	Orbiter goes on internal power.
T-2 minutes, 55 seconds	Pressurize liquid oxygen tank and retract gaseous oxygen vent hood.
T-1 minute, 57 seconds	Pressurize liquid hydrogen tank.
T-28 seconds	Orbiter computers start launch sequence. Start solid rocket booster hydraulic units.
T-6.8 seconds	Go for main engine start.
T-3 seconds	Main engines at 90 percent thrust.
T-0	Solid rocket booster ignition, holddown post release and liftoff.
T+7 seconds	Tower clear, control switches to Mission Control.

LAUNCH WINDOW

STS-5 will be launched from Complex 39's Pad A at Kennedy Space Center no earlier than Nov. 11, 1982. The launch window on that date extends from 7:19 a.m. to 7:59 a.m. EST, for a launch opportunity of 40 minutes in duration.

The shortness of this launch window, compared to previous launch windows, is due to a daylight landing constraint at Edwards, as well as the contingency landing sites, and to obtain the proper orbital positioning for deploying the two commercial satellites on the first and second days of the mission.

The window assumes a nominal landing on a dry lake bed at Edwards Air Force Base, Calif.

STS-5 will be launched into a 160 nautical mile (185 statute mile) circular orbit with an inclination to the equator of 28.5 degrees.

STS-5 FLIGHT SEQUENCE OF EVENTS

Event	Mission Elapsed Time Days/Hrs:Min:Sec	Comments
SRB ignition/liftoff	0/00:00:00	
Pitchover	0/00:00:08	
Max Q	0/00:01:07	675 lbs/ft^2
SRB separation	0/00:02:07	158,077 ft alt, 28 nm downrange
MECO	0/00:08:35	57 nm alt, 763 nm downrange
ET separation	0/00:08:56	
OMS-1 burn	0/00:10:38	241 fps, 51.5x160 nm orbit
OMS-2 burn	0/00:44:48	194 fps, 160x160 nm orbit
SBS separation burn	1/00:13:25	16 fps, 169x160 nm orbit
Recircularization 1	1/00:47:00	1.8 fps, 167x160 nm orbit
Recircularization 2	1/00:51:00	12.3 fps, 160x160 nm orbit
Telesat separation burn	1/08:21:20	16 fps, 160x169 nm orbit
RCS orbit adjust	2/20:58:00	32 fps, 145x164 nm orbit
RCS orbit adjust (Five 30-second burns 30 minutes apart)	3/05:26:27	55 fps, 139x152 nm orbit
Deorbit ignition	5/01:12:00	261 fps, -2x151 nm entry orbit
Entry interface (400 Kft)	5/01:39:00	
Landing	5/02:09:00	

GUIDE TO USING THE FLIGHT PLAN

1. Summary Level Timeline (12-hour timespan)

   a. **Timescales:** Two time references are presented in this section. The two time references used are Central Standard Time (CST) (or TIG minus) and Mission Elapsed Time (MET). MET is referenced to liftoff beginning at 00/00:00:00 (days, hours, minutes and seconds).

   b. **Crewmen (CDR, PLT, MS-1, MS-2):** This is the column where titles of scheduled activities are shown for the commander (CDR), pilot (PLT), and mission specialist (MS-1, MS-2) at the appropriate times.

   c. **Day/Night and Orbit:**

      1) The orbital day/night intervals are shown by black bars when the orbiter is in darkness.

      2) **Orbit** - indicates which orbit the spacecraft is in by numerical sequence. The beginning of an orbit occurs when the orbiter crosses the earth's equator going from the southern to the northern hemisphere (ascending node). The succession of orbits is numbered in this column starting with Orbit 1 for launch.

   d. **Earth Trace W/SAA:** This is a display of the ground track of the orbiter and when it passes over the South Atlantic Anomaly (SAA) (indicated by a ├───┤).

   e. **GSTDN Coverage:** The GSTDN communication coverage periods are indicated in this area with a horizontal line indicating when communication is available; the GSTDN site is identified to the right of the line.

   f. **Deorbit OPT:** Times are identified in this area when deorbit burn opportunities exist for Edwards AFB (EDW) and Kennedy Space Center (KSC).

   g. **Attitudes and Maneuvers:**

      1) **Attitude** - The current attitude of the vehicle is identified in this area, i.e., PCT, Nose to SUN.

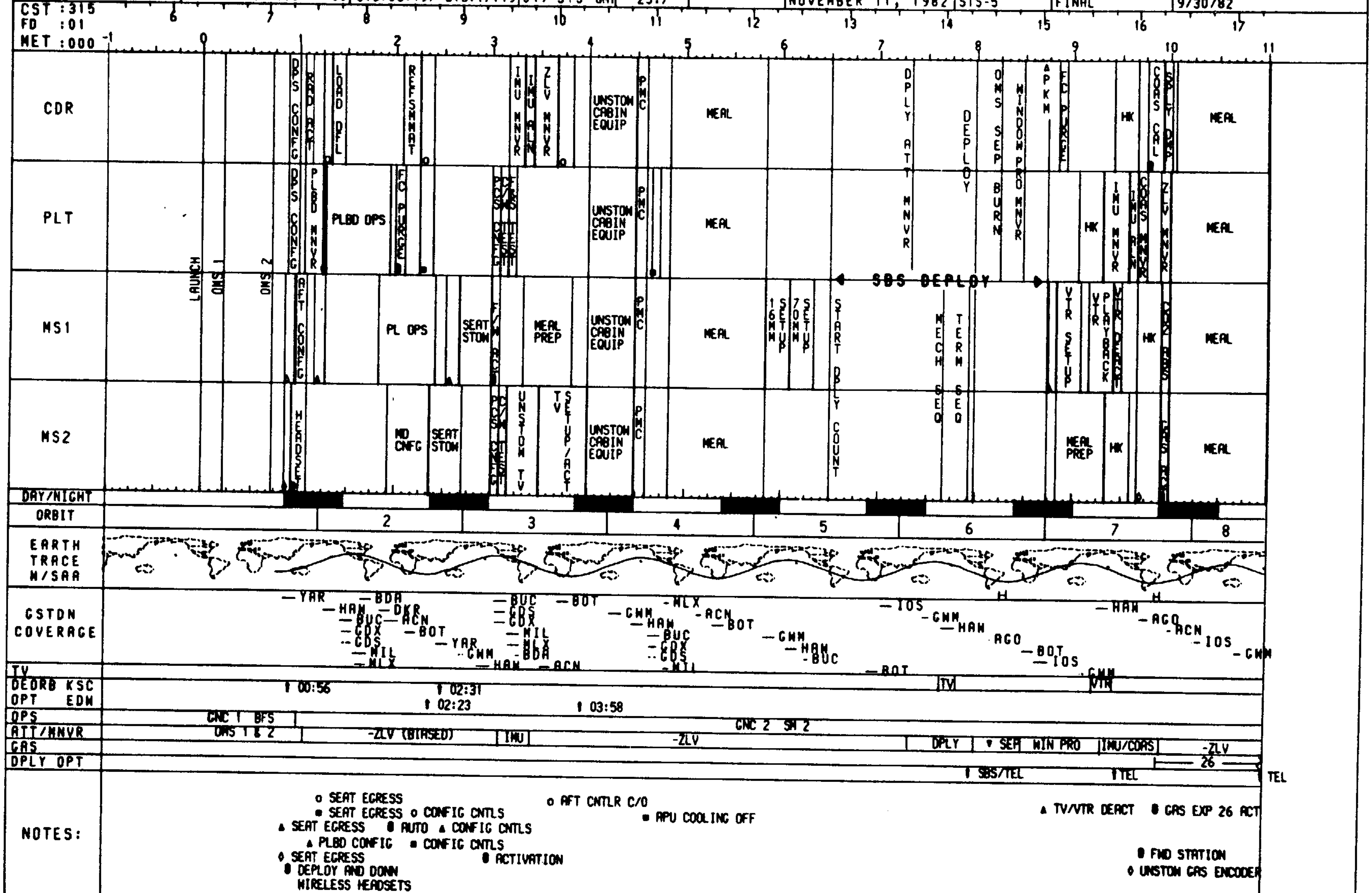
      2) **Maneuvers** - An ' ' is placed at the time an attitude maneuver occurs if the duration in attitude is to be greater than 15 minutes.

   h. **VTR:** Indicates periods when the video tape recorder is running (indicated by a ├───┤). TV - TV is indicated in this area with a ├───┤.

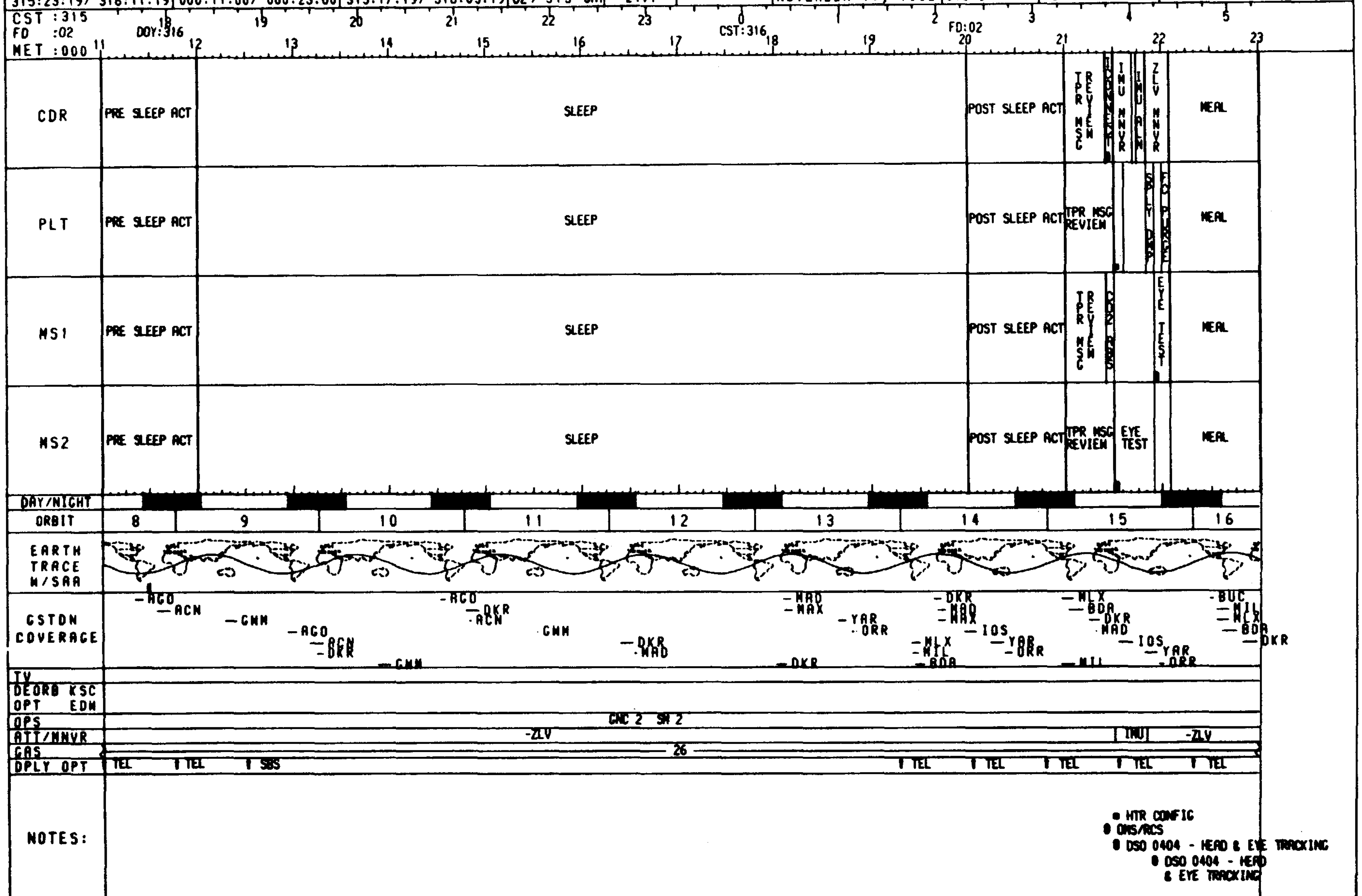
   i. Payload operating periods.

SUMMARY TIMELINE

GMT (D:H:M)	MET (D:H:M)	CST (D:H:M)	FD/ DOY	BETA	MOON	HOUSTON DATE	FLIGHT	EDITION	PUB. DATE
315:11:19/ 315:23:19	000:01:00/ 000:11:00	315:05:19/ 315:17:19	01/ 315 GMT	-25.7		NOVEMBER 11, 1982	STS-5	FINAL	9/30/82



GMT (D:H:M)	MET (D:H:M)	CST (D:H:M)	FD/ DOY	BETA	MOON	HOUSTON DATE	FLIGHT	EDITION	PUB. DATE
315:23:19/ 316:11:19	000:11:00/ 000:23:00	315:17:19/ 316:05:19	02 / 315 GMT	-24.1		NOVEMBER 11, 1982	STS-5	FINAL	9/30/82



GMT (D:H:M)	MET (D:H:M)	CST (D:H:M)	FD/ DOY	BETA	MOON	HOUSTON DATE	FLIGHT	EDITION	PUB. DATE
316:11:19/ 316:23:19	000:23:00/ 001:11:00	316:05:19/ 316:17:19	02/ 316 GMT	-22.2		NOVEMBER 12, 1982	STS-5	FINAL	9/30/82

CST :316 6 7 8 9 10 11 12 13 14 15 16 17
FD :02
MET :000 23 MET:001 0 1 2 3 4 5 6 7 8 9 10 11

CDR: MEAL | HK | EXER | BURN PREP | MEAL PREP | IMU MNVR | IMU ALN | THRSHLD | ZLV MNVR | MEAL | MIS ACTY | PMC | HK | NCS CLN | DPLY ATT MNVR | DEPLOY | OMS SEP BURN | WINDOW PRO MNVR | APKM | MEAL | ED PURGE | PRE ACT | SLEEP

PLT: MEAL | MAG INVERT | HK | MAG INVERT | BURN PREP | RECIRC | ZLV MNVR | IMU ALIGN | S-BD TEST | COAS CAL | MEAL | PMC | MIS ACTY | HK | EXER | TELESAT DEPLOY | SPLY DMP | MEAL | PRE ACT | SLEEP

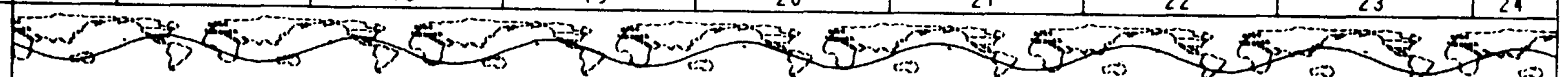
MS1: MEAL | KIN TEST | BURN PREP | ACCEL SENSE | HK | EXER | MEAL | ACCEL SENSE | PMC | HK | MIS ACTY | START DPLY COUNT | MECH SEQ | TERM SEQ | MEAL | DX VAL | PRE ACT | SLEEP

MS2: MEAL | SPONGE GROWTH | CSTL GRW | KIN TEST | HK | SPNG GRW | BURN PREP | ACCEL SENSE | S-BD TEST | MIS ACTY | MEAL | ACCEL SENSE | PMC | EXER | HK | TV SETUP/ACT | MEAL PREP | MEAL | ODO RBS | PRE ACT | SLEEP

DAY/NIGHT

ORBIT: 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24

EARTH TRACE W/SAA



GSTDN COVERAGE: IOS, YAR, HAW, BUC, CDS, GDX, MIL, BDA, DKR, ACN, BOT, YAR, HAW, ACN, BUC, CDS, GDX, MIL, MLX, BDA, BOT, YAR, GWM, HAW, BUC, CDS, GDX, MIL, MLX, ACN, BOT, GDX, CDS, GWM, HAW, BUC, BOT, IOS, GWM, HAW, BOT, IOS, GWM, HAW, AGO, BOT, IOS, GWM, HAW, AGO, ACN, GWM

TV: TV

DEORB KSC: 23:29 | 01:05 | 02:40

OPT EDW: 00:56 | 02:32 | 04:07

OPS: GNC 2 SM 2

ATT/MNVR: -ZLV | RECIRC | -ZLV | S-BD | IMU/COAS | -ZLV | DPLY | SEP | W/P | STARBOARD SUN

CAS: 26 | 26 LOW G

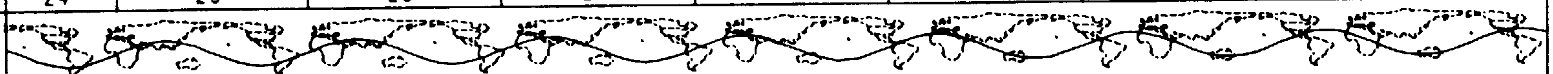
DPLY OPT: TEL | TEL | TEL | SBS/TEL | TEL | TEL | TEL

NOTES:

- START RUNS 1,2,3
- CRYSTAL GROWTH EXP - START
- DSO 0406 - KINESTHETIC REPEATABILITY
- SPONGE GROWTH EXP - STOP RUN 1
- DSO 0406 - KINESTHETIC REPEATABILITY
- ICONN RET OMS/RCS
- OMS/RCS
- DSO 0405 - ACCEL DETECTION SENSITIVITY
- DTO 0404 - COLD OMS ENGINE RESTART
- DTO 0706 - S-BAND/UHF ANT TEST
- DTO 0770 - AFT STATION
- DSO 0408 - NEAR VISION ACUITY
- DTO 0774 - S TRK THRESHOLD VER
- DSO 0408 - NEAR VISION ACUITY
- DSO 0405 - ACCEL DETECTION SENSITIVITY
- DSO 0408 - NEAR VISION ACUITY
- DSO 0408 - NEAR VISION ACUITY
- ICONN RET OMS/RCS
- TV/VTR DEACT
- STBD SUN MNVR DTO 0102 - NONSYMMETRICAL/ COLD OMS POD TCS TEST
- DSO 0301 - OXYGEN INTERACTION VALIDATION - HTR ON

GMT (D:H:M)	MET (D:H:M)	CST (D:H:M)	FD/ DOY	BETA	MOON	HOUSTON DATE	FLIGHT	EDITION	PUB. DATE
316:23:19/ 317:11:19	001:11:00/ 001:23:00	316:17:19/ 317:05:19	03 / 316 GMT	-20.3		NOVEMBER 12, 1982	STS-5	FINAL	9/30/82

CST :316 — 18 DOY:317, 19, 20, 21, 22, 23, 0 CST:317, 1, 2, 3, 4, 5
FD :03 — FD:03
MET :001 — 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23

CDR	SLEEP; POST SLEEP ACT; TPR MSG REVIEW; IMU CONNECT; SLY DMP; FC PURGE; MEAL; RCS HOT; FIRE; EOD PREP
PLT	SLEEP; POST SLEEP ACT; TPR MSG REVIEW; PGS CNFG; IMU MNVR; IMU ALN; THRSHLD; STRD SUN MNVR; MEAL; HK; ECLSS C/O
MS1	SLEEP; POST SLEEP ACT; TPR MSG REVIEW; PGS CNFG; ACCEL SENSE; ASE TEMP CHECK; MEAL; HK; KIN TEST; 16MM S/U AND ACT
MS2	SLEEP; POST SLEEP ACT; TPR MSG REVIEW; ACCEL SENSE; COAS; MEAL; VTR SETUP; VTR PLAYBACK
DAY/NIGHT	
ORBIT	24, 25, 26, 27, 28, 29, 30, 31, 32
EARTH TRACE W/SAA	
CSTDN COVERAGE	AGO; ACN; GWM; AGO; ACN; DKR; GWM; DKR; DKR; MAD; MAX; BDA; DKR; MAD; MAX; IOS; YAR; ORR; MIL; MLX; BDA; DKR; MAD; MAX; IOS; YAR; ORR; MIL; MLX; BDA; DKR; IOS; YAR; ORR; GDX; GDS; MIL; MLX; BDA; DKR; BUC
TV	VTR
DEORB KSC OPT EDW	
OPS	GNC 2 SM 2
ATT/MNVR	STARBOARD SUN; IMU; STBD SUN; RCS; STBD SUN (PRCS CNTL)
GAS	26
DPLY OPT	SBS; TEL; TEL; TEL; TEL; TEL; TEL
NOTES:	OMS/RCS; MANUAL; DTO 0111 - VRCS SING ENG SOAKBACK TEST - INH ALL PORT RCS; DSO 0405 - ACCEL DETECTION SENSITIVITY; DTO 0774 - S TRK THRESHOLD VER; DSO 0406; TV/VTR DEACT

GMT (D:H:M)	MET (D:H:M)	CST (D:H:M)	FD/ DOY	BETA	MOON	HOUSTON DATE	FLIGHT	EDITION	PUB. DATE
317:11:19/ 317:23:19	001:23:00/ 002:11:00	317:05:19/ 317:17:19	03/ 317 GMT	-18.4		NOVEMBER 13, 1982	STS-5	FINAL	9/30/82

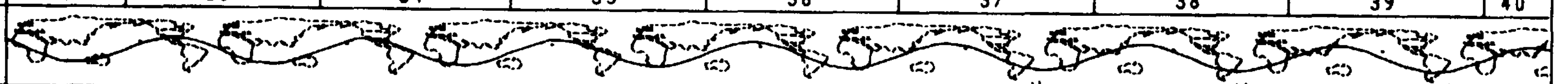
CST :317 — 6 7 8 9 10 11 12 13 14 15 16 17
FD :03
MET :001 23 — NET:002 0 1 2 3 4 5 6 7 8 9 10 11

CDR	HK; EXER; MEAL; HK; PNC; VRCS TEST; RND PERF; GLOW MNVR; GLOW EXP; SBD MNVR SUN; MEAL; IMU MNVR; IMU ALN; THRSHLD; SBD MNVR SUN; SPLY DMP; FD PURGE; PRE ACT SLEEP; SLEEP
PLT	EXER; PRSD PREP; PRSD; C/W TEST; MEAL; HK; PNC; PCS CHECK; PRSD; PRSD PWR; 70MM S/U; SETUP; GLOW EXP; MEAL; AIRFRAME; DISTORT; POSN BD; PRE ACT SLEEP; SLEEP
MS1	16MM S/U AND ACT; MEAL PREP; 16MM S/U AND ACT; PRSD; FD S/W; TEST; MEAL; EYE TEST; PNC; HK; PRSD; EXER; TV SETUP; 16MM S/U AND ACT; MEAL; TV ACT; EVA EQUIP PREP; TV SETUP; PRE ACT SLEEP; SLEEP
MS2	SPONGE; GROWTH; 16MM S/U AND ACT; 35MM CAMR S/U; HK; KIN TEST; MEAL; EYE TEST; PNC; PCS CHECK; TV; SETUP/ACT; HK; GLOW EXP; MEAL PREP; EXER; MEAL; ASE TEMP; CHECK; EVA EQUIP PREP; CO2 ABS; WCS CLN; PRE ACT SLEEP; SLEEP

DAY/NIGHT

ORBIT: 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40

EARTH TRACE W/SAA



GSTDN COVERAGE: DKR, BOT, IOS, YAR, CDS, MIL, MLX, BDA, HAW, DKR, BUC, ACN, CDX, BOT, YAR, GWM, HAW, MLX, BDA, ACN, BUC, CDS, CDX, MIL, BOT, YAR, GWM, HAW, BUC, CDS, CDX, MIL, MLX, ACN, BOT, GWM, HAW, BUC, BOT, IOS, GWM, HAW, AGO, BOT, IOS, GWM, HAW, AGO, ACN, IOS, GWM, HAW, AGO, ACN

TV: TV

DEORB KSC: 23:39; 01:14

OPT EDW: 01:06; 02:41

OPS: GNC 2 SM 2

ATT/MNVR: STARBOARD SUN (PRCS CNTL) | (VRCS/PRSD) | GLOW | STARBOARD SUN (PRCS CNTL) | IMU | STARBOARD SUN

CAS: 26

DPLY OPT: SBS/TEL; TEL; TEL; TEL

NOTES:

- STOP RUN 2, START RUN 4
- RCS REG RECONFIG
- DSO 0406 - KINESTHETIC REPEATABILITY
- DTO 0401 - PRSD STRAT TEST - PWR UP
- DSO 0404 - HEAD & EYE TRACKING
- DSO 0404 - HEAD & EYE TRACKING
- DTO 0613 (DEPLOY RADS)
- DSO 0904
- DTO 0401 - PRSD STRAT TEST - PWR DOWN
- VRCS TEST
- TV/VTR DEACT
- DTO 0111 & 0401 - VRCS SINGLE ENG SOAKBACK TEST MNVR AND PRSD TEST MNVR
- DTO 0102 - NONSYMMETRICAL/COLD OMS POD TCS TEST
- TV/VTR DEACT
- 16MM CAMR ACT
- DTO 0317
- DTO 0774 - S TRK THRESHOLD VER
- DTO 0111 - VRCS SINGLE ENGINE SOAKBACK TEST - ENABLE VRCS
- ICONN RET OMS/RCS

GMT (D:H:M)	MET (D:H:M)	CST (D:H:M)	FD/ DOY	BETA	MOON	HOUSTON DATE	FLIGHT	EDITION	PUB. DATE
317:23:19/ 318:11:19	002:11:00/ 002:23:00	317:17:19/ 318:05:19	04 / 317 GMT	-16.5		NOVEMBER 13, 1982	STS-5	FINAL	9/30/82

CST :317 18 19 20 21 22 23 0 CST:318 1 2 3 4 5
FD :04 DOY:318 FD:04
MET :002 11 12 13 14 15 16 17 18 19 20 21 22 23

CDR	SLEEP; POST SLEEP ACT; TPR MSG REVIEW; HOUSEKEEPING; MEAL; IMU MNVR; IMU ALIGN; STBD SUN; MNVR; SPEC PURGE; DAP; MNVR; STBD SUN; MNVR; HK; OMS DEORBIT; TV SETUP/ACT; EXER
PLT	SLEEP; POST SLEEP ACT; TPR MSG REVIEW; MEAL; OMS RCS; EVA SUPPORT
MS1	SLEEP; POST SLEEP ACT; TPR MSG REVIEW; MEAL; AIRLOCK PREP; START PREBREATHE; EVA PREP
MS2	SLEEP; POST SLEEP ACT; TPR MSG REVIEW; MEAL; AIRLOCK PREP; EVA PREP
DAY/NIGHT	
ORBIT	40 41 42 43 44 45 46 47 48
EARTH TRACE W/SAA	
GSTDN COVERAGE	GWM; AGO; ACN; DKR; ACN; GWM; GWM; AGO; DKR; DKR; MAD; DKR; MAD; MAX; YAR; ORR; MLX; MIL; BDA; MAX; IOS; YAR; ORR; DKR; MAD; DKR; MAD; MIL; MLX; BDA; IOS; YAR; ORR; BDA; DKR; IOS; YAR; MIL; MLX; GDS; MIL; MLX; BDA; HAW; BUC; GDX
TV	
DEORB KSC OPT EDW	
OPS	GNC 2 SM 2
ATT/MNVR	STARBOARD SUN; IMU; STBD SUN; RCS; STARBOARD SUN
GAS	26; 26 LOW G; 26
DPLY OPT	SBS; TEL; TEL; TEL
NOTES:	● OMS/RCS ● DTO 0102 - NON-SYMMETRICAL/ COLD OMS POD TCS TEST o ARCS SOAKBACK DTO 0109 - ARCS THREE ENGINE SOAKBACK TEST - HIGH -Z TRANS ● MNVR TO ARCS BURN ATT

GMT (D:H:M)	MET (D:H:M)	CST (D:H:M)	FD/ DOY	BETA	MOON	HOUSTON DATE	FLIGHT	EDITION	PUB. DATE
318:11:19/ 318:23:19	002:23:00/ 003:11:00	318:05:19/ 318:17:19	04/ 318 GMT	-14.6		NOVEMBER 14, 1982	STS-5	FINAL	9/30/82

CST :318 6 7 8 9 10 11 12 13 14 15 16 17
FD :04
MET :002 23 MET 003 0 1 2 3 4 5 6 7 8 9 10 11

CDR: EXER | SNACK | 16MM S/U AND ACT | HK | 16MM S/U AND ACT | MEAL PREP | PMC | FIRE L/O | FIRE L/O | MNVR | FIRE L/O | MEAL | FIRE L/O | MEAL | FIRE L/O | IMU ALIGN | NOSE SUN | MNVR | PRE SLEEP ACT | SLEEP

PLT: EVA SUPPORT | SNACK | EVA SUPPORT | PMC | FIRE L/O | MNVR | FIRE L/O | HK | FIRE L/O | MNVR | MEAL | FIRE L/O | MEAL | MNVR | FIRE L/O | IMU MNVR | EXER | PRE SLEEP ACT | SLEEP

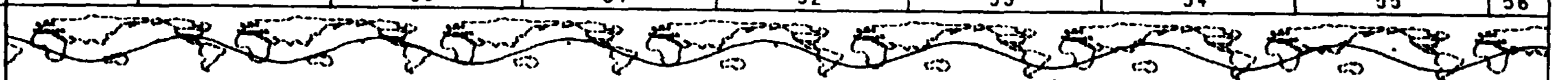
MS1: EVA PREP | EVA | POST EVA ACT | PMC | ASE TEMP | CHECK | EMU MAINT RECHG | MEAL | WCS CLN | HK | PRE SLEEP ACT | SLEEP

MS2: EVA PREP | EVA | POST EVA ACT | PMC | SPNG GRW | EMU MAINT RECHG | MEAL | HK | PRE SLEEP ACT | SLEEP

DAY/NIGHT

ORBIT: 48 | 49 | 50 | 51 | 52 | 53 | 54 | 55 | 56

EARTH TRACE W/SAA



GSTDN COVERAGE: MIL BDA DKR ACN BOT YAR HAW — BUC ACN CDX BOT CDS YAR MIL MLX BDA DKR GWM HAW — CDX MIL MLX ACN BOT BUC CDS GWM HAW — BUC CDX CDS — BOT IOS GWM HAW — BOT IOS GWM HAW AGO BOT IOS — GWM HAW AGO ACN — GWM — AGO ACN

TV: TV | TV | TV

DEORB KSC: 23:47 | 01:22

OPT EDW: 01:14 | 02:49

OPS: GNC 2 SM 2

ATT/MNVR: STARBOARD SUN | ARCS TEST | IMU | NOSE SUN

GAS

DPLY OPT: TEL | TEL | SBS/TEL | TEL | TEL

NOTES:

▲ AIRLOCK EGRESS
◆ AIRLOCK EGRESS
● DTO 0611 - EMU/EVA EVALUATION
● DTO 0613 (STDN RADS)
○ 16MM CAMR ACT
● DSO 0301 - OXYGEN INTERACTION VALIDATION - HTR OFF
▲ AIRLOCK INGRESS
◆ AIRLOCK INGRESS
● DTO 0110 - ARCS SINGLE ENGINE DUTY CYCLE SOAKBACK TEST
● SPONGE GROWTH EXP - START RUN 5
○ POST ARCS DTO 0109 - ARCS THREE ENGINE SOAKBACK TEST - ENABLE PORT POD PRCS
● ICONN RET OMS/RCS
● DTO 0102 - NONSYMMETRICAL/ COLD OMS POD TCS TEST

-22-

GMT (D:H:M)	MET (D:H:M)	CST (D:H:M)	FD/ DOY	BETA	MOON	HOUSTON DATE	FLIGHT	EDITION	PUB. DATE
318:23:19/ 319:11:19	003:11:00/ 003:23:00	318:17:19/ 319:05:19	05/ 318 GMT	-12.8		NOVEMBER 14, 1982	STS-5	FINAL	9/30/82

CST :318 18 DOY:319 19 20 21 22 23 0 CST:319 1 2 3 4 5
FD :05 FD:05
NET :003 11 12 13 14 15 16 17 18 19 20 21 22 23

CDR	SLEEP / POST SLEEP ACT / TPR MSC REVIEW / FC PURGE / HK / IMU MNVR / IMU ALN / MEAL / FDS CONFIG / DPS CNFG / FCS C/O / DPS CNFG / FDS CONFIG / VIS ACUY
PLT	SLEEP / POST SLEEP ACT / TPR MSC REVIEW / HYD/ATCS / SPLY DMP / MEAL / HYD/ATCS / FDS CONFIG / FCS C/O / FDS CONFIG / VIS ACUY
MS1	SLEEP / POST SLEEP ACT / TPR MSC REVIEW / CKOUT RBS / EYE TEST / ACCEL SENSE / MEAL / ACCEL SENSE / VIS ACUY / EXER
MS2	SLEEP / POST SLEEP ACT / TPR MSC REVIEW / EYE TEST / ASE TEMP / CHECK ACCEL / SENSE / MEAL / ACCEL SENSE / EXER / VIS ACUY / 16MM SETUP / TV SETUP/ACT
DAY/NIGHT	
ORBIT	56 57 58 59 60 61 62 63 64
EARTH TRACE W/SAA	
GSTDN COVERAGE	GWM, AGO, ACN, DKR, GWM, AGO, DKR, DKR, MAD, DKR, MAD, MAX, YAR, ORR, MIL, MLX, BDA, DKR, MAD, MAX, IOS, YAR, ORR, MIL, MLX, BDA, DKR, IOS, YAR, ORR, BUC, MIL, MLX, BDA, DKR, IOS, YAR, HAW, MLX, BDA, BUC, GDS, GDX, MIL
TV	
DEORB KSC OPT EDW	
DPS	GNC 2 SM 2 / GNC 8 SM 2 / GNC 2 SM 2
ATT/MNVR	NOSE SUN / IMU / NOSE SUN / FREE DRIFT / NOSE SUN
CAS	
DPLY OPT	SBS

NOTES:

- DTO 0406 ○ NOSE SUN MNVR
- DSO 0404 - HEAD & EYE TRACKING
- DSO 0404 - HEAD & EYE TRACKING
- DTO 0406
- G8 TO G2 TRANSITION
- DSO 0408 - NEAR VISION ACUITY
- APU VENT HTR ACT
- APU COOLING OFF
- G2 TO G8 TRANSITION
- DSO 0405 - ACCEL DETECTION SENSITIVITY
- DSO 0405 - ACCEL DETECTION SENSITIVITY

GMT (D:H:M)	MET (D:H:M)	CST (D:H:M)	FD/ DOY	BETA	MOON	HOUSTON DATE	FLIGHT	EDITION	PUB. DATE
319:11:19/ 319:23:19	003:23:00/ 004:11:00	319:05:19/ 319:17:19	05/ 319 GMT	-10.9		NOVEMBER 15, 1982	STS-5	FINAL	9/30/82

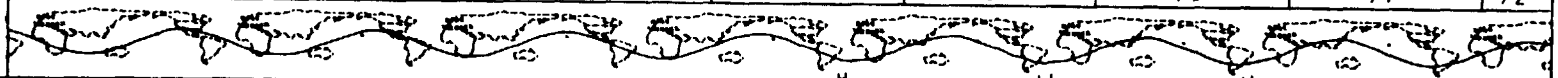
CST :319 — 6 7 8 9 10 11 12 13 14 15 16 17
FD :05
MET :003 — 23 0 (MET:004) 1 2 3 4 5 6 7 8 9 10 11

CDR	MEAL PREP · MEAL · PWC · EXER · CABIN STOWAGE · MEAL PREP · CABIN STOWAGE · MEAL · COAS REST · HK · SPLY DMP · FC PURGE · WCS CLN · PRE SLEEP ACT · SLEEP
PLT	HK · MEAL · PWC · XLV MNVR · LVLH TEST · ZLV MNVR · EXER · CABIN STOWAGE · MEAL · IMU MNVR · IMU ALN · PTC MNVR · PTC INIT · HK · PRE SLEEP ACT · SLEEP
MS1	MEAL · PWC · EVA ENT PREP · KIN TEST · HK · CABIN STOWAGE · MEAL · ASE TEMP CHECK · PRE SLEEP ACT · SLEEP
MS2	CONV CURRENTS EXP · SPNG GRW · CONV CURRENTS EXP · MEAL · PWC · EVA ENT PREP · HK · KIN TEST · STOW GAS · ENCODER · CABIN STOWAGE · MEAL · COAS TEST · PRE SLEEP ACT · SLEEP

DAY/NIGHT

ORBIT: 64 · 65 · 66 · 67 · 68 · 69 · 70 · 71 · 72

EARTH TRACE W/SAA



GSTDN COVERAGE: BDA · ORR · ACN · BOT · YAR · GDX · GDS · MIL · MLX · BDA · HAW · BUC · ACN · BOT · YAR · GWM · HAW · BUC · GDX · GDS · MIL · MLX · ACN · BOT · GWM · HAW · BUC · BOT · IOS · GWM · HAW · BOT · IOS · HAW · AGO · IOS · GWM · HAW · AGO · ACN · GWM · ACN · AGO

TV: TV

DEORB KSC OPT EDW: 23:46 · 01:12

OPS: GNC 2 SM 2

ATT/MNVR: NOSE SUN · LVLH · -ZLV · IMU · PTC

GAS

DPLY OPT: TEL · TEL · TEL

NOTES:

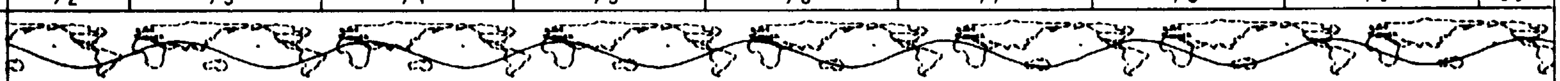
- SPONGE GROWTH EXP - START RUN 6
- TV/VTR DEACT
- DTO 0757 - DAP PERF IN LVLH MODE
- DSO 0406 - KINESTHETIC REPEATABILITY
- DSO 0406 - KINESTHETIC REPEATABILITY

GMT (D:H:M)	MET (D:H:M)	CST (D:H:M)	FD/ DOY	BETA	MOON	HOUSTON DATE	FLIGHT	EDITION	PUB. DATE
319:23:19/ 320:11:19	004:11:00/ 004:23:00	319:17:19/ 320:05:19	06 / 319 GMT	-9.1		NOVEMBER 15, 1982	STS-5	FINAL	9/30/82

TIG -8 -7 -6 -5 -4 -3

FD :06 DOY:320 FD:06

MET :004 11 12 13 14 15 16 17 18 19 20 21 22 23

CDR	SLEEP; POST SLEEP ACT; TPR MSG REVIEW; IMU MNVR; IMU ALN; MEAL; DPS CONFIG; PLBD OPS; IMU ALIGN; UPDATE
PLT	SLEEP; POST SLEEP ACT; TPR MSG REVIEW; SEC DPS; MEAL; RAD BYP; CRT TIMER; PLBD OPS; APU HTR
MS1	SLEEP; POST SLEEP ACT; TPR MSG REVIEW; CO2 ABS; MEAL; PLBD CNFG; PL OPS; AFT CONFG; INSTALL; SEAT
MS2	SLEEP; POST SLEEP ACT; TPR MSG REVIEW; MEAL; ENT STOW; TV STOW; INSTALL; SEAT
DAY/NIGHT	
ORBIT	72 73 74 75 76 77 78 79 80
EARTH TRACE W/SAA	
GSTDN COVERAGE	GWM; AGO; ACN; DKR; GWM; DKR; DKR; MAD; MAX; BDA; DKR; MAD; MAX; IOS; YAR; ORR; MIL; MLX; BDA; DKR; MAD; IOS; YAR; ORR; MIL; MLX; BDA; DKR; IOS; YAR; ORR; MLX; BDA; DKR; BUC; GDX; GDS; MIL; BOT; YAR; HAW; GDX; GDS; MIL; MLX; BDA; BUC
TV	
DEORB OPT KSC EDW	
OPS	GNC 2 SM 2
ATT/MNVR	PTC; IMU; TRAIL SUN; TOP SUN
GAS	
DPLY OPT	SBS; TEL; TEL

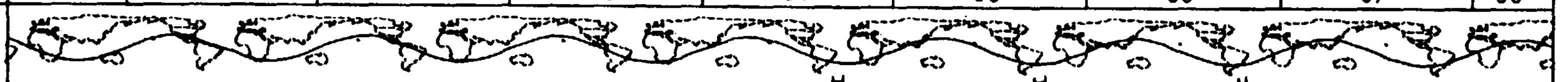
NOTES:

- ○ TRAIL SUN MNVR
- ■ LAST MEAL CLEANUP
- ● FES CNTLR CHECK
- ○ IMU MNVR
- ○ RAD FLOW
- ▲ DFI WB CAL
- ▲ PCM RCDR REWIND
- ○ TOP SUN MNVR
- ● SSME HYD REPRESS

GMT (D:H:M)	MET (D:H:M)	CST (D:H:M)	FD/ DOY	BETA	MOON	HOUSTON DATE	FLIGHT	EDITION	PUB. DATE
320:11:19/ 320:23:19	004:23:00/ 005:11:00	320:05:19/ 320:17:19	06/ 320 GMT	-7.3	●	NOVEMBER 16, 1982	STS-5	FINAL	9/30/82

TIG -2 -1 0
FD :06 MET:005
MET :004 23 0 1 2 3 4 5 6 7 8 9 10 11

CDR	DED DISP; DPS ENT; CONFIG; DONN; HARNESS; ENTRY SW VER; ENTRY REVIEW; BURN PREP
PLT	DED DISP; DPS ENT; CONFIG; DONN; HARNESS; ENTRY SW VER; ENTRY REVIEW; BURN PREP; DEORBIT BURN; ENTRY INTERFACE; LANDING
MS1	DONN HARNESS; S TRKR; SECURE; AFT STA; SW VERIF; BURN PREP
MS2	DONN HARNESS; M/D SW VERIF; MCS DEACT; BURN PREP
DAY/NIGHT	
ORBIT	80 81 82 83 84 85 86 87 88
EARTH TRACE W/SAA	
GSTON COVERAGE	DKR ACN BOT YAR GWM HAW BUC GDX CDS MIL MLX ACN BOT GWM HAW BUC GDX CDS MIL MLX ACN BOT GWM HAW BOT IOS GWM HAW BOT IOS HAW AGO IOS GWM AGO ACN GWM AGO ACN DKR
TV	
DEORB OPT KSC	23:43
DEORB OPT EDW	01:10
OPS	G2 S2 GNC 3 BFS
ATT/MNVR	TOP SUN
CAS	
DPLY OPT	



NOTES:

○ SEAT INGRESS
● SEAT INGRESS
▸ INSTALL SEAT ◇ SEAT INGRESS
▲ C&W RESET
▲ SECURE AFT STA
▲ SEAT INGRESS
▸ INSTALL SEAT

IF THINGS GO WRONG

All methods of aborting the Space Shuttle launch are aimed toward safe and intact recovery of the orbiter and its payloads. Flight crews and Mission Control Center-Houston flight controller teams train extensively for an abort situation everyone hopes will never happen.

The abort-to-orbit (ATO) is the preferred type of abort. This would follow loss of one main engine near the end of main-stage flight in which the orbital maneuvering engines (OMS) could provide enough additional boost to reach a minimal 194-km (105-nm) orbit and still leave enough OMS fuel for the deorbit burn.

Earlier shutdown of one main engine or a major orbiter systems failure after orbital insertion calls for an abort-once-around (AOA) in which Columbia would land at White Sands Missile Range, N.M., at the end of one orbit. Loss of two engines midway through powered flight forces a trans-Atlantic abort landing (TAL) into Dakar, Senegal. Dakar is the first landfall for orbiters launched into 28.5-degree inclination orbits, as are STS-4 through STS-8 and STS-11 through STS-15. The trans-Atlantic abort landing site for STS-1, 2 and 3 was Rota, Spain.

Early shutdown of one or more engines calls for a return-to-launch-site abort (RTLS). After an abort decision, Columbia would be flown in a pitch-around maneuver to heads-up and pointed back along the ground track to Kennedy Space Center. Whatever main engine thrust still available would then be used to kill off eastward velocity, until westward motion would get Columbia within gliding distance of the Kennedy runway.

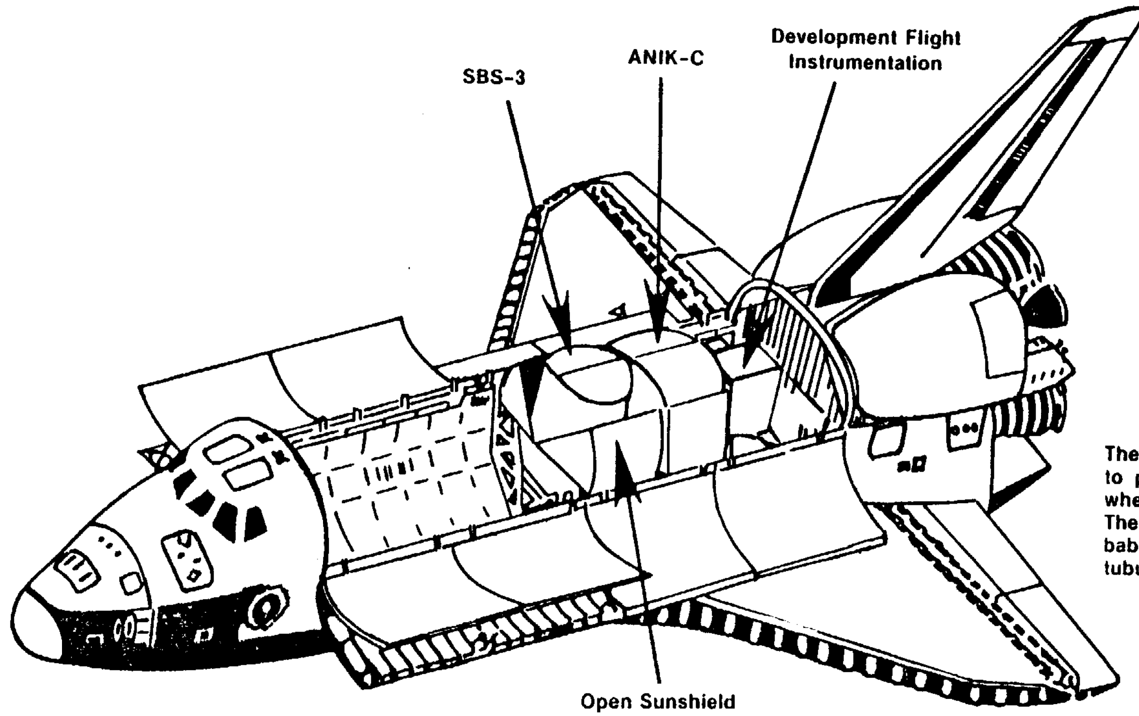
STS-5 contingency landing sites are Kennedy; Edwards Air Force Base, Calif.; White Sands Missile Range, N.M.; Hickam Air Force Base/Honolulu International Airport, Hawaii; Kadena Air Base, Okinawa; Dakar, Senegal; and Rota, Spain.

CONFIGURATION

READYING COLUMBIA FOR ITS FIRST COMMERCIAL CARGO FLIGHT

For STS-5, pyrotechnics have been removed from the two flight deck ejection seats and two mission specialist seats have been installed -- one on the aft flight deck and one on the mid-deck. The ejection seats and their rails will eventually be removed from Columbia along with other major modifications at Palmdale, Calif., after STS-9/Spacelab 1. Currently it is planned to modify Columbia to carry the European Space Agency (ESA) Spacelab on STS-9. Challenger will fly STS-6, 7 and 8.

The payload deployment and retrieval system, or remote manipulator arm, has been removed for STS-5 for a weight savings of 447 kilograms (985 pounds).



The payload is covered by a sunshield to protect against thermal extemes when the orbiter bay doors are open. The sunshield, resembling a two-piece baby buggy canopy, is constructed of tubular aluminum and mylar sheeting.

STS-5 Payload Configuration [Top View]

(Courtesy SBS)

The remote arm will be installed only on flights calling for its use. In addition to the SBS-3 and Anik C-3 communications satellites and their cradle fixtures, the developmental flight instrumentation (DFI) package and the Getaway Special canister occupv the payload bay.

The STS-5 vehicle will weigh 2,035,976 kg (4,488,559 lb.) at solid rocket booster ignition.

EXTRAVEHICULAR ACTIVITY

FIRST SHUTTLE SPACEWALK TESTS SPACE REPAIR TECHNIQUES

STS-5 mission specialists Dr. William Lenoir and Dr. Joseph Allen will don the new-generation Shuttle spacesuits early on Nov. 14 and go through the airlock into Columbia's payload bay. For approximately three and a half hours, Lenoir and Allen will evaluate the spacesuit on its first outing in space and also test prototype space tool and repair devices. Some of the tools will be used to work on a simulated black box on the the work station. The box is similar to a panel box on the ailing Solar Maximum Mission satellite. A repair mission to the satellite, including a satellite capture and extravehicular activity, is tentatively scheduled for STS-13.

Lenoir and Allen will be the first American astronauts to go outside their spacecraft since Feb. 3, 1974, when Skylab 4 commander Jerry Carr and science pilot Dr. Ed Gibson spent five hours 19 minutes retrieving film canisters from the space stations's solar observatory.

Spacesuits have been stowed aboard Columbia on all four orbital test flights for possible emergency closing of the payload bay doors, but the STS-5 extravehicular activity or spacewalk is the first planned on the Shuttle program. Earlier it was planned to depressurize Columbia's cabin from 14.7 pounds per square inch (psi) to 10.2 psi for some 12 hours prior to an EVA to allow denitrogenization of crewmen's bloodstreams.

For STS-5, Lenoir and Allen will prebreath 100 percent oxygen in the spacesuits for three and a half hours in the airlock to wash nitrogen from their bloodstreams. The airlock will then be depressurized to 5 psi for spacesuit leak checks before going all the way to space vacuum. After the airlock hatch is opened, both men will attach themselves to safety tethers clipped to slidewires running aft along the payload bay door hingelines.

Lenoir will move toward the aft bulkhead along the starboard (right) slidewire while Allen monitors his motion. Allen then moves along the port slidewire to join Lenoir at the aft bulkhead. Enroute, both men evaluate translation rates, handholds and safety tethers, spacesuit communications and television, floodlighting in the payload bay and potential work sites for contingency extravehicular activities.

A miniature black-and-white television camera atop Allen's space helmet will also be evaluated as an aid.

Both crewmen are back at the forward bulkhead an hour and 20 minutes after extravehicular start to conduct a series of tests with tools and devices at the work station mounted on the starboard side of the payload bay. For an hour, the two will make torque measurements on fixed and torsion-adjustable bolts with a wrench that measures torque from zero to 600 inch-pounds.

Measurements will be voiced to Brand and Overmyer in the aft deck for recording. These measurements are aimed at correlating actual inflight torque forces for ground simulations in one-gravity and in the Johnson Weightless Environment Test Facility (WETF).

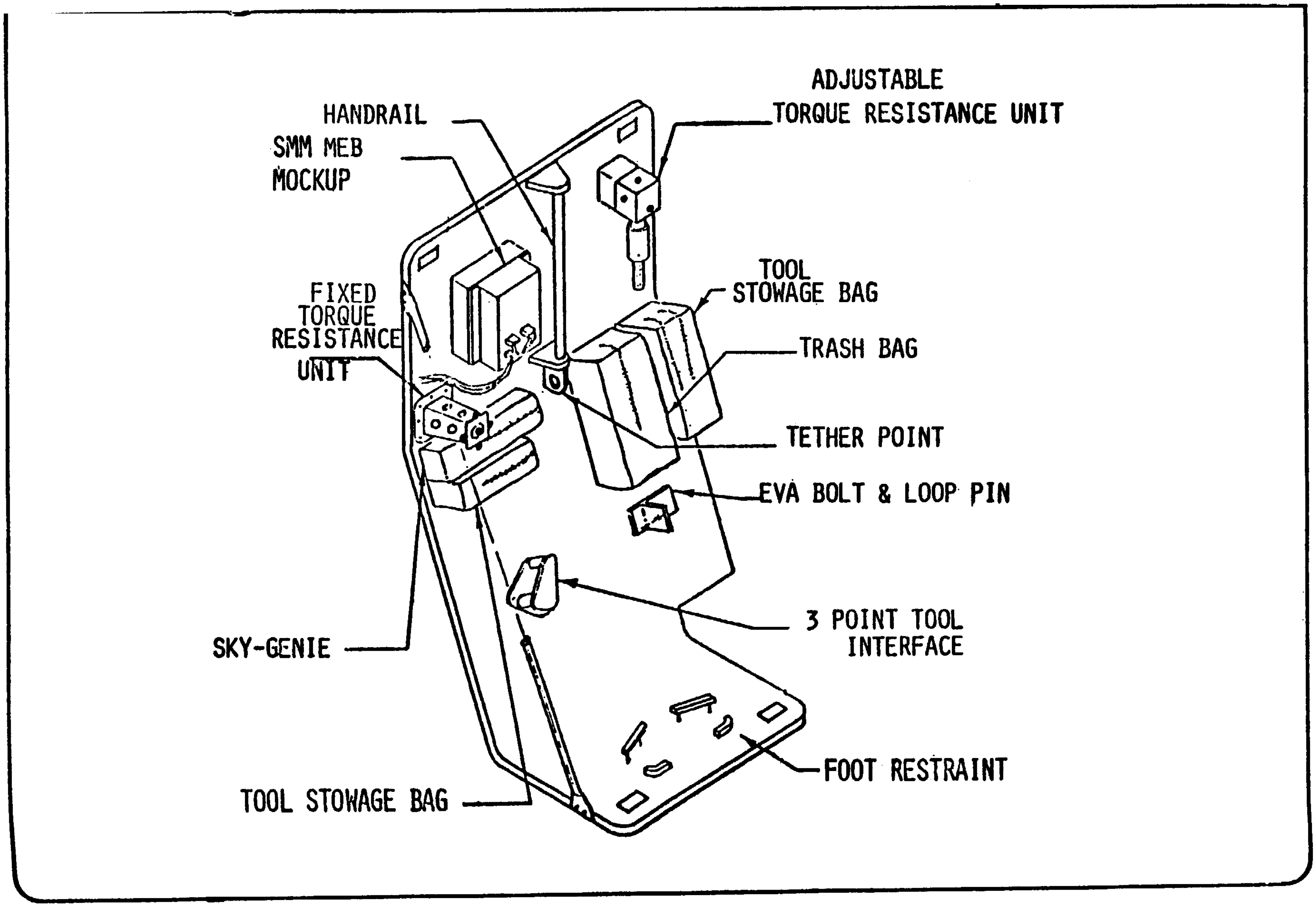
For what will be the most complex task in the space walk, Lenoir will overhaul a mockup Solar Maximum Mission satellite coronagraph main electronics box (MEB) on the work station while Allen hands him tools. With pressurized spacesuit gloves, he will remove a thermal blanket, back out mounting bolts, demate cable connectors, cut a grounding strap and remate the connectors -- all hardware not designed for inflight space maintenance or repair. Among the tools used by Lenoir will be one designed for possible use in Space Telescope extravehicular activity operations.

Allen will next operate the winch on the forward bulkhead that is intended for contingency payload bay door closing. The winch line will wind through a series of pulleys to a "Sky-Genie" variable-friction device adjusted to about 45 kg (100 lb.) tension. Allen will crank the winch both with and without foot restraints to measure a crewman's capability to apply manual loads to such devices. The winch tasks, to which 30 minutes have been allotted, also demonstrate handling rope in zero-gravity.

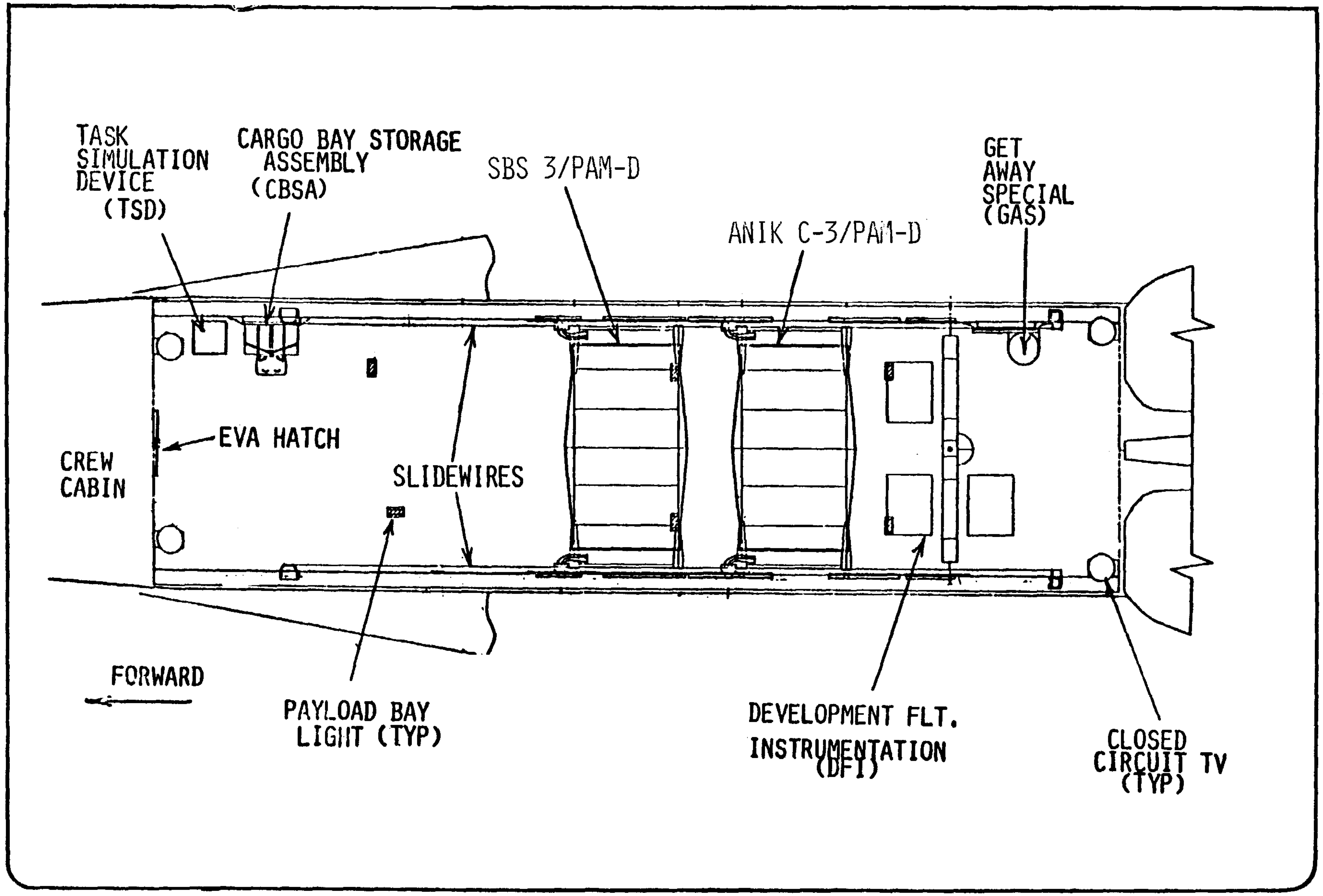
The final extravehicular activity task before crawling back into the airlock will be a 15-minute "translation with a large mass" in which Allen carries a 27-kg (60-lb.) bag of latch tools across the forward bulkhead and part-way down the hingeline slidewire.

Allen and Lenoir have a shopping list of additional extravehicular activity tasks if time permits, including evaluation of tape, Velcro and thermal gloves from the toolbox, installing a payload retention device between a bulkhead handrail and the work station, removing from the work station an "extravehicular activity bolt", similar to those in the payload bay door drive mechanism and installing a bulkhead latch tool at the work station.

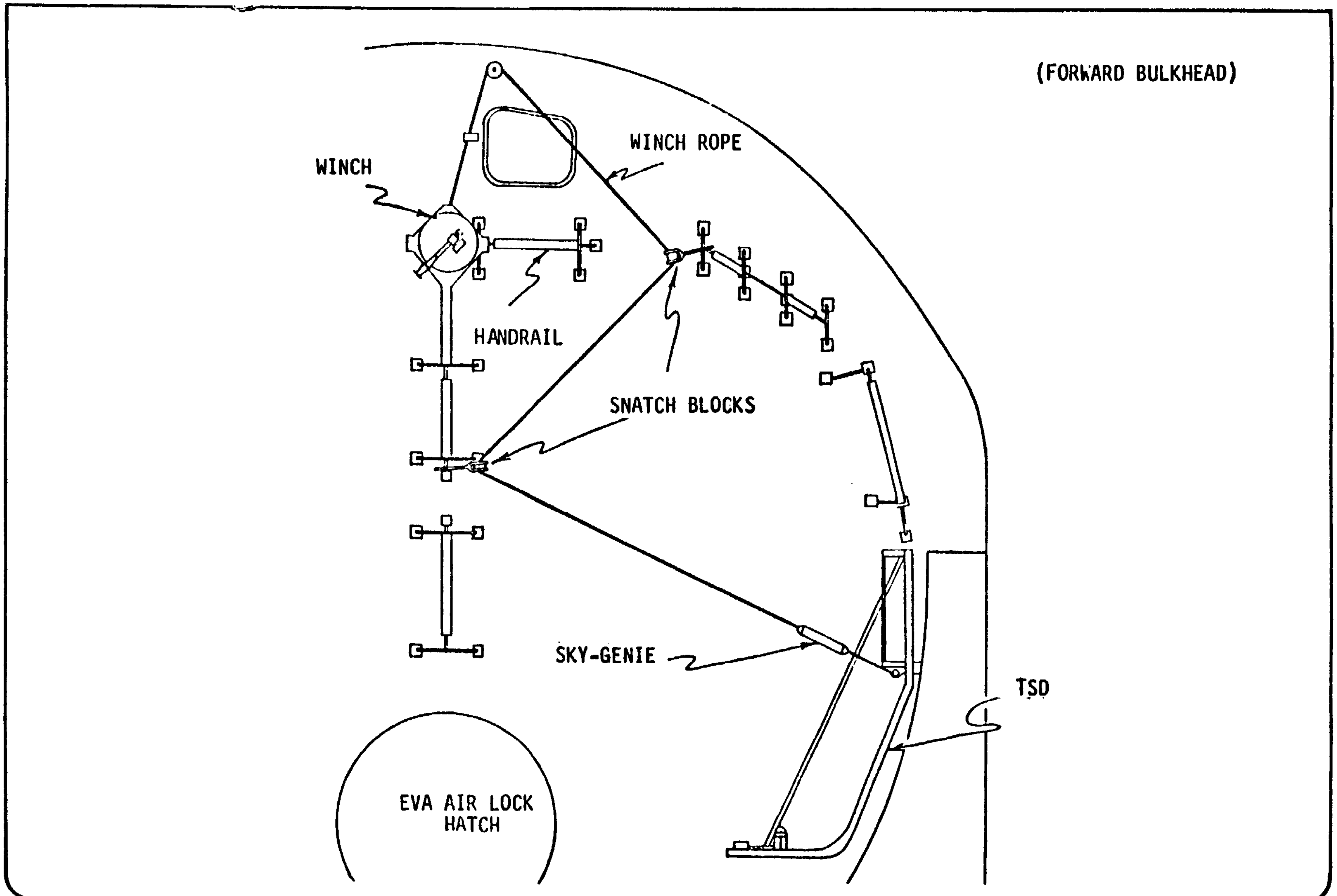
TASK SIMULATION DEVICE



STS-5 PAYLOAD BAY CONFIGURATION



WINCH ROPE ROUTING



After stowing tools and equipment in the payload bay, the two men will enter the airlock, repressurize to 5 psi, and switch the spacesuit life support and communications back to orbiter internal power before equalizing airlock pressure with cabin pressure. The life support backpacks are then recharged after Allen and Lenoir doff the spacesuits.

DEPLOYMENT OF SBS-3 AND ANIK C-3

SBS-3 and Anik C-3 -- in telescoped configuration -- will be carried into orbit in special cradles bolted to the deck and bulkheads of the orbiter payload bay. Each truss-like aluminum structure contains an ejection system, a turntable mechanism and lightweight sun shield.

Deployment procedures will be essentially identical for both spacecraft. SBS-3 will be deployed from the Columbia about 3:30 p.m. EST, Nov. 11 and Anik C-3 about 24 hours later (3:25 p.m. EST, Nov. 12).

Predeployment activities begin about six hours before the spacecraft is ejected from the bay. Updated computations on Columbia's orbit -- altitude, velocity, inclination -- are fed to the spacecraft control center which in turn provides the mission control center in Houston with refined payload injection information. Then this is passed on to the mission specialist aboard Columbia in charge of the deployment.

Shortly before ejection, Pilot Overmyer will orient the Columbia to the prescribed deployment attitude (close to perpendicular to earth) with the cargo bay doors facing in the opposite direction of Columbia's direction of travel. When the orbiter is properly pointed a series of events will take place under the watchful eyes of the mission specialist -- Lenoir for SBS-3, Allen for Anik C-3.

The sun shield canopy will be drawn back to expose the satellite. A 50 rpm spin will be imparted to the cradle's turntable giving the satellite and attached Payload Assist Module a rotating action to stabilize their path. At the prescribed time explosive bolts will fire to release a Marman clamp holding the spring-loaded spacecraft down. It will separate from the orbiter moving away from the Columbia at about three feet per second, while continuing to orbit the earth at an altitude of 185 mi. (160 nm), a velocity of about 28,164 km/hr (17,500 mph) and an inclination of 28.5 degrees.

Once deployment occurs the responsibility for the spacecraft shifts from NASA to the satellite's control center -- SBS control center in Washington, D.C., and Telesat Canada's control facility in Ottawa.

The orbiter will then move away to a position about 26 km (16 mi.) from the satellite. The Columbia will change to an attitude so that the belly of the orbiter will face the satellite at the moment of the Payload Assist Module ignition.

Forty-five minutes after deployment from the payload bay, the perigee engine will automatically fire to place the satellite into a highly elliptical transfer orbit.

SBS-3

Satellite Business Systems' SBS-3 is the first commercial satellite to be launched from the Space Transportation System. It will share the payload bay with Telesat Canada's Anik C-3 on the first operational flight of the Space Shuttle (STS-5).

SBS-3 is designed to provide all-digital communications and features time-division, multiple access techniques for efficient use of satellite transmission communications.

The satellite is 2.1 m (7 ft.) in diameter and 6.4 m (21 ft.) tall when deployed in orbit. The exterior surface of the satellite is covered with approximately 14,000 solar cells that generate 1,000 watts of dc power. An onboard power subsystem, including rechargeable batteries, powers the satellite's communications subsystem, including 10 operational transponder channels. Redundant traveling-wave-tube amplifiers provide a transmit power of 20 watts for each channel.

Three general types of services are provided by SBS:

* **Communications Network Service** which consists of high capacity private networks for all-digital integrated transmission of voice, data, video and electronic mail among an SBS customer's widely dispersed facilities in the United States.

* **Message Service I** is a high quality, economical long distance service for businesses and a second version, **Message Service II**, for residential customers to begin in 1982.

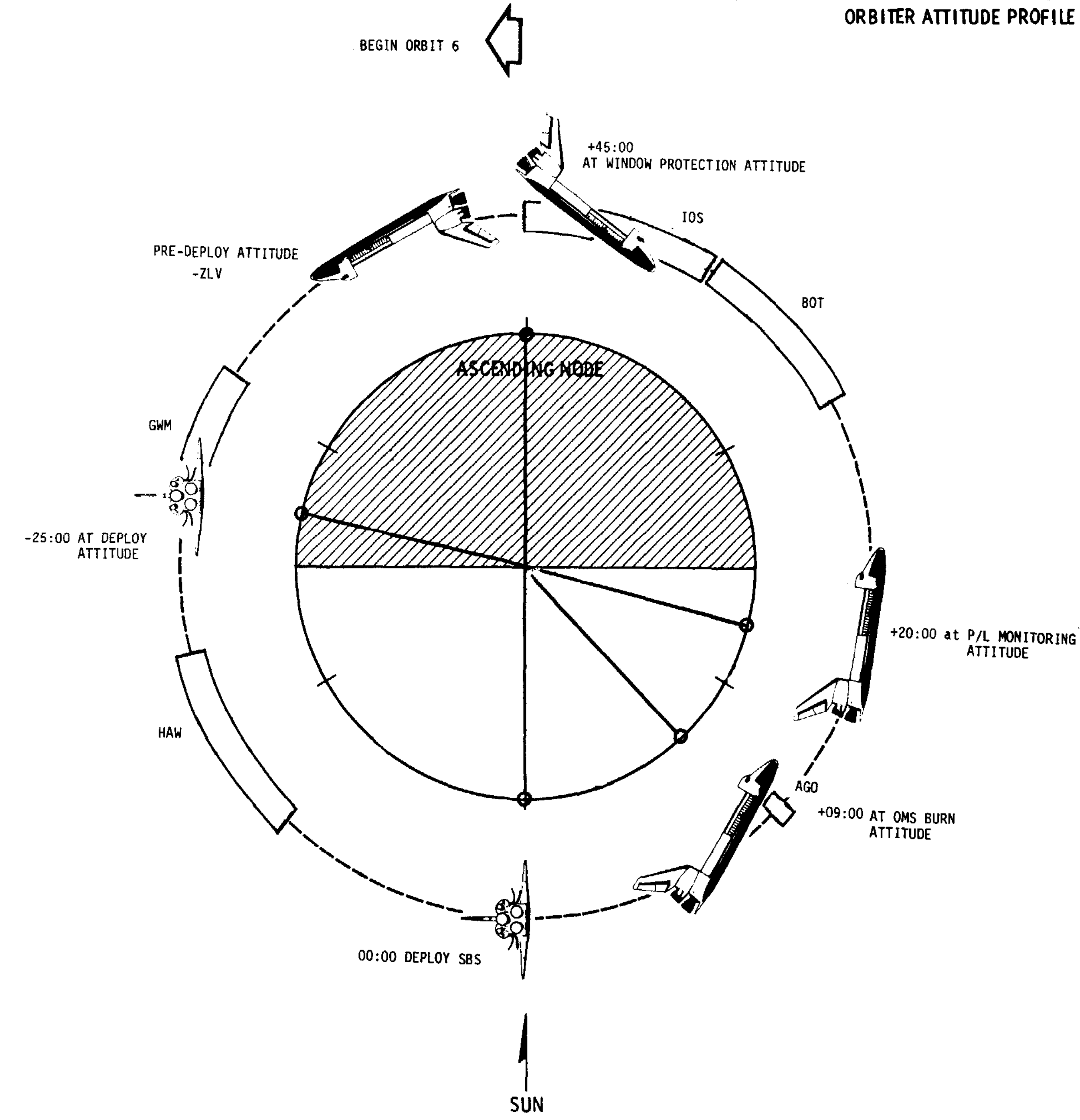
* **Spare Transponder Service** is an offering of spare satellite capacity for communications firms, broadcasters and cablecasters using the only Ku-band transponder capability offered by a U.S. carrier.

SBS-3 will weigh about 3,277 kg (7,225 lb.) when ejected from the payload bay.

ORBITER ATTITUDE PROFILE

ORBIT 6 EVENTS

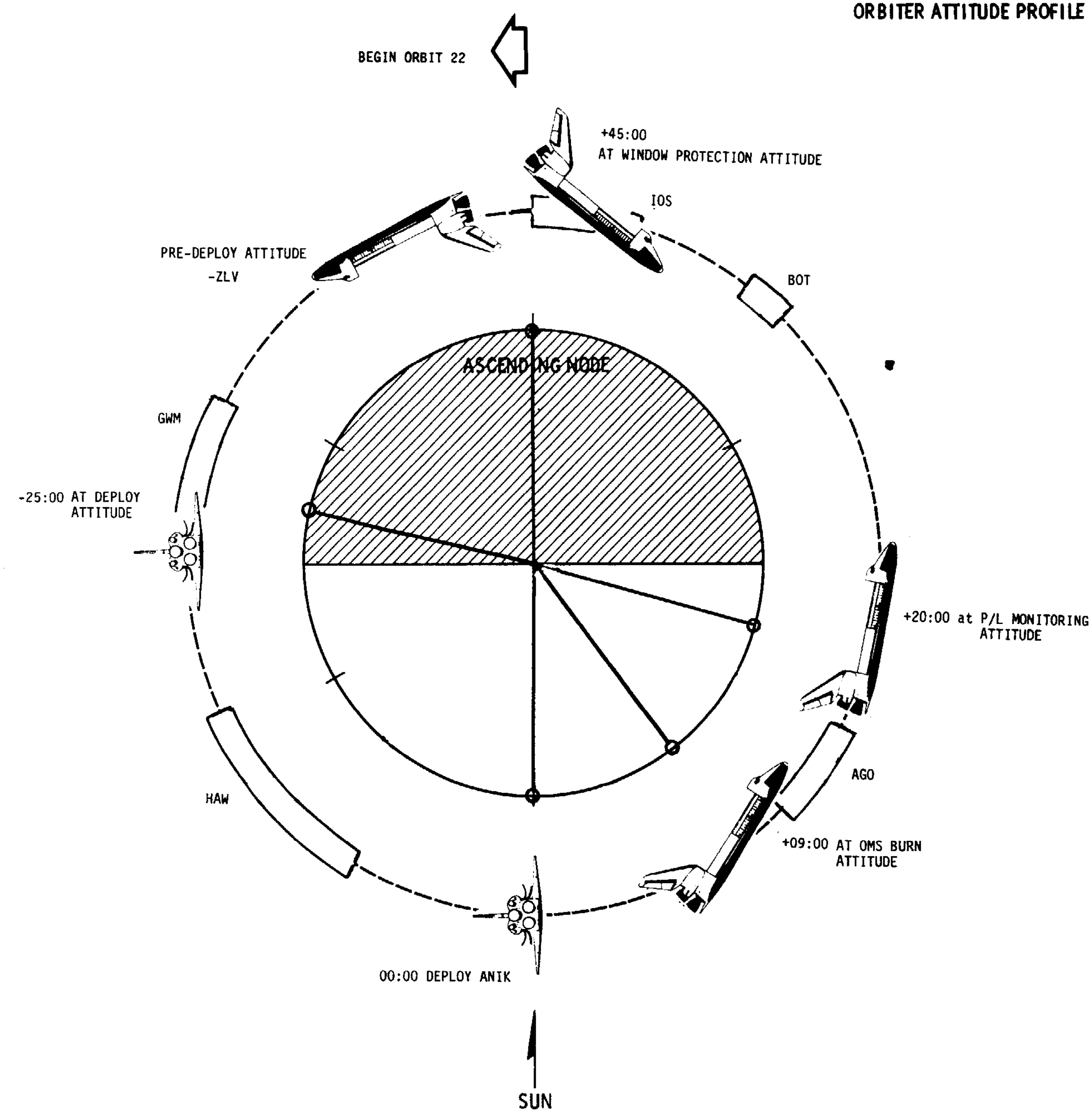
-45:00	BEGIN ORBIT 6
-40:00	INITIATE MNVR TO DEPLOY ATTITUDE
-30:00	TO -26:00 GWM <u>CONTACT</u>
-29:00	SUNRISE
-25:00	AT DEPLOY ATTITUDE
-20:00	MECHANICAL SEQUENCE START
-19:00	TO -10:00 <u>HAW CONTACT</u>
-03:00	TERMINAL SEQUENCE START
00:00	DEPLOY SBS
00:00	TO +35:00 RECORD PAM DATA
+03:00	INITIATE MNVR TO OMS BURN ATTITUDE
+09:00	AT OMS BURN ATTITUDE
+11:00	TO 12:00 <u>AGO CONTACT</u>
+15:00	OMS SEP BURN
+18:00	INITIATE MNVR TO PAYLOAD MONITORING ATTITUDE
+25:00	SUNSET
+31:00	INITIATE MNVR TO WINDOW PROTECTION ATTITUDE
+31:00	TO +39:00 <u>BOT CONTACT</u>
+39:00	TO +48:00 <u>IOS CONTACT</u>
+45:00	PAM PERIGEE MOTOR FIRING INITIATE INERTIAL ATTITUDE HOLD



<u>ORBIT 22 EVENTS</u>

-45:00	BEGIN ORBIT 22
-40:00	INITIATE MNVR TO DEPLOY ATTITUDE
-29:00	SUNRISE
-28:00	TO 24:00 GWM CONTACT
-25:00	AT DEPLOY ATTITUDE
-20:00	MECHANICAL SEQUENCE START
-16:00	TO 08:00 HAW CONTACT
-03:00	TERMINAL SEQUENCE START
00:00	DEPLOY ANIK
+03:00	INITIATE MNVR TO OMS BURN ATTITUDE
+12:00	TO 17:00 AGO CONTACT
+15:00	OMS SEP BURN
+18:00	INITIATE MNVR TO PAYLOAD MONITORING ATTITUDE
+25:00	SUNSET
+31:00	INITIATE MNVR TO WINDOW PROTECTION ATTITUDE
+33:00	TO 35:00 BOT CONTACT
+41:00	TO +50:00 IOS CONTACT
+45:00	PAM PERIGEE MOTOR FIRING INITIATE INERTIAL ATTITUDE HOLD

ORBITER ATTITUDE PROFILE



This includes the Payload Assist Module (PAM-D) with 1,960 kg (4,325 lb.) of solid propellant for thrusting the satellite from parking orbit to transfer orbit, an apogee kick motor with 495 kg (1,089 lb.) of solid propellant for synchronous orbit injection and the satellite itself, weighing 600 kg (1,326 lb.) including about 136 kg (300 lb.) of hydrazine fuel for eight to 10 years of stationkeeping operation.

The SBS-3 spacecraft is manufactured by Hughes Aircraft Co., El Segundo, Calif. SBS-1 and SBS-2 were launched by NASA's Delta rocket.

SBS is a private communications company headquartered in McLean, Va. The firm is owned by subsidiaries of Aetna Life and Casualty, Comsat General Corp. and IBM.

ANIK C-3

Telesat Canada's Anik C-3 communications satellite will be launched from the bay of the orbiter Columbia on the second day of the STS-5 mission. It will join four other operational Anik communications satellites in geosynchronous orbit.

The C series satellites will be the most powerful domestic satellites in commercial service until the latter half of the decade.

The satellite service of Telesat Canada is the principal means of providing modern voice, message, data, facsimile and broadcast service to remote and northern parts of Canada. The satellite links complement and augment the terrestrial communications networks and provide a large measure of system diversity to the terrestrial carriers.

The Anik C-3 satellite will be the first in a series to provide rooftop-to-rooftop transmission of integrated voice, video and data communications for Canadian businesses, carry newly licensed Canadian pay-TV and other broadcast services.

Anik C-3 will weigh about 632 kg (1,394 lb.) in geosynchronous orbit. Its solar cells produce more than 1,100 watts of dc electrical power to operate the spacecraft's systems. The satellite is 2.1 m (7 ft.) wide and 6.4 m (21 ft.) tall when fully deployed. The spin-stabilized Anik C-3 will operate in the high-frequency radio bands, 14 and 12 GHz with 16 transponders.

The combination of higher transmission power (from 15-watt output tubes) and the 14/12 GHz bands will allow the use of small 1.2 m (3.9 ft.) dish antennas in places, such as home rooftops and high density office buildings.

Anik C-3's antenna coverage will include virtually all of populated Canada with four contiguous spot beams serving the western, west-central, east-central and eastern regions of the country. Telesat's customers will be able to choose regional, half or whole nation coverage, depending on their needs.

The spacecraft was built under contract by Hughes Aircraft Co., El Segundo, Calif.

Telesat Canada is headquartered in Ottawa, Ontario, Canada.

FLIGHT EXPERIMENTS

Shuttle Student Involvement Program

Three student experiments will be conducted aboard Columbia during STS-5. The experiments will be installed in mid-deck stowage lockers in the orbiter cabin area. The experiments were selected from proposals made by students through a program supervised by NASA and the National Science Teachers Association.

Growth of Porifera in Zero Gravity

The experiment of Aaron K. Gillette, now attending Western Carolina University, devised when he was a student at Winterhaven High School, Winterhaven, Fla., is designed to study the effect of zero gravity on sponge, Porifero, in relation to its regeneration of structure, shape and spicule (needlelike structure that supports soft tissue) formation following separation of the sponge.

The experiment consists of 18 heat-sealed polyester packets containing Porifera Microciona (sponge) in a growth solution. Starter ions (calcium and magnesium) and a fixative are separated by color-coded clamps from the growth solution. To initiate the experiment, a color-coded clamp is released on each packet to liberate the starter into the growth solution. At 30 minutes, one hour, 24 hours, 48 hours and mission termination, a color-coded clamp is released on each of three packets to liberate the fixative. The experiment is configured for installation in half a mid-deck stowage locker.

Sponsors for Gillette's experiment are Tania Hogan of Martin Marietta Aerospace and William Knott of NASA's Kennedy Space Center.

Convection in Zero Gravity

D. Scott Thomas, now attending Utah State University, when a student at Richland High School, Johnstown, Pa., set up an experiment to study surface tension convection in zero gravity. It will study the effects of boundary layer conditions and geometries on the onset and character of the convection.

The Convection in Zero Gravity experiment consists of a frame holding four pans with hinged lids and heaters imbedded in the bottom and sides.

A crew member removes the experiment from the mid-deck locker, secures it to the airlock wall and sets up a TV camera. He then injects a pan with oil and activates the heater and TV camera. The heater will run for two and one-half minutes, ample time for convection to occur. The camera will view the process for five minutes so that ceasing of convection can be observed. Following the observation, the controller is turned off, oil is withdrawn, the pan wiped out and the experiment continued with another pan while the first pan cools. After 10 cycles the experiment is concluded and returned to the locker.

R. Gilbert Moore, Thiokol Corp., and Roger Kroes of NASA's Marshall Space Flight Center, are sponsors of the experiment.

Formation of Crystals in Weightlessness

Michelle A. Issel, now attending American University, formerly of M.T. Sheehan High School, Wallingford, Conn., is conducting an experiment to compare crystal growth in zero gravity to that in one-g to determine if weightlessness eliminates the causes of malformations in crystals.

The experiment consists of a hot plate (solute cup) and a cold plate (sting) driven by small thermoelectric heat pumps. The experiment is charged with a saturated solution tri-glycine sulphate before flight. The self-contained experiment which is initiated by a switch is carried in a half-size mid-deck stowage locker.

John Alyward of United Technologies, Hamilton Standard and Liam Sarsfield of NASA's Lewis Research Center, Cleveland, are sponsors.

Getaway Special

Officially titled "Small Self-Contained Payloads," the Getaway Special program is offered by NASA to provide anyone who wishes the opportunity to fly a small experiment aboard the Space Shuttle. The experiment must be of scientific research and development nature.

The Getaway specials, which are flown on Shuttle missions on a space-available basis, are available to industry, educational organizations, and domestic and foreign governments for legitimate scientific purposes.

The second Getaway Special payload will use X-rays to radiate through metallic samples and record their appearance periodically on film during micro-gravity processing.

The study of physical processes occurring in liquid metals shortly before or during solidification is hampered by the lack of direct optical observation.

Metallic samples which were processed and solidified on earlier space missions under micro-gravity conditions had to be analyzed after the fact solely with the aid of polished cross-sections. The interpretation of results was often difficult because of the missing intermediate stages in sample development.

In this experiment, X-rays will be used to radiate through the metallic samples and their appearance will be recorded on film.

The objectives of this investigation include the development of an autonomously working X-ray unit together with a transparent thermostat (oven). The sample will consist of a liquid in dispersion of two insoluble metals which exhibit a mixing gap in the liquid state. These metals will be homogenized by a temperature treatment. Documentation of the homogenization and the time-dependent stability of the dispersion while cooling will be investigated by the X-ray technique.

With this technique, several phenomena may be made visible and quantitatively evaluated including diffusional homogenization, particle movement, particle growth and convection currents.

The canister is located in the aft section of the payload bay.

The experiment is part of the material science program of the German Ministry of Research and Technology (BMFT).

Orbiter Experiments Program

A complete and accurate assessment of Shuttle performance during the launch, boost, orbit, atmospheric entry and landing phases of a mission requires precise data collection to document the Shuttle's response to these conditions.

The NASA Headquarters Office of Aeronautics and Space Technology (OAST), through its Orbiter Experiments Program, is providing research experiments onboard the Shuttle orbiter to record specific, research-quality data.

The primary objective of the Orbiter Experiments Program is to increase the technology reservoir for development of future space transportation systems. The data also will be useful to the Office of Space Flight (OSF) to further certify Shuttle and expand its operational envelope.

In addition this data will be used to verify the accuracy of wind tunnel and other ground-based simulations made prior to flight; verify ground-to-flight extrapolation methods; and verify theoretical computational methods.

STS-5 Orbiter Experiments include:

Aerodynamic Coefficient Identification Package (ACIP)

The primary objectives of the Aerodynamic Coefficient Identification Package are:

* To collect aerodynamic data during the launch, entry and landing phases of the Shuttle;

* To establish an extensive aerodynamic data base for verification of the Shuttle's aerodynamic performance and the verification and correlation with ground-based data, including assessments of the uncertainties of such data;

* To provide flight dynamics data in support of other technology areas, such as aerothermal and structural dynamics.

This package has flown on STS-1 through 4. It will fly again on STS-5 and current plans call for continued operation on future Shuttle flights, including the operation of a second unit on OV99, Shuttle orbiter Challenger.

Instruments in this package include dual-range linear accelerometers and rate gyros. Also included are the power conditioner for the gyros, the power control system and the housekeeping components. The package is installed colinearly with the geometric axes of the orbiter and post-installation measurements made to establish the position within 10 arc minutes.

The instruments continuously sense the dynamic X, Y and Z attitudes and performance characteristics of the orbiter through these critical flight phases. The Aerodynamic Coefficient Identification Package also provides high rate sampling of the positions of orbiter control surfaces for recording with the package's attitude data.

Principal technologist is D.B. Howes of Johnson Space Center, Houston.

Tile Gap Heating Effects (TGH) Experiment

Analyses and ground tests have shown that the gaps between the tiles of the thermal protection system generate turbulent airflow, which will cause increased heating during the reentry phase of flight. Tests have also shown that the heating effect may be reduced by optimum design of the gaps and by altering the radii at the edges of the tiles. The tile gap experiment was devised to further the investigations of heating phenomena.

The results will enable improvements in reusable element thermal protection systems to reduce the convective heating caused by gaps and other discontinuities.

The orbiter will be instrumented with a removable panel 45.7 cm (18 in.) square, which will carry 11 tiles of baseline material and size. The panel will be fitted to the underside of the orbiter fuselage. The gaps between tiles will be carefully calculated and controlled during fitting to ensure that the heating rates generated during entry will be no higher than those of the baseline tile array. The aim is to produce a design that will result in heating rates lower than those of the baseline system.

In addition to gap spacing, the gap depth will also be controlled through the use of fillers fitted at the bottom of certain gaps -- i.e., at the junction of the tiles and the orbiter fuselage skin. The radii at the outer edges of the tiles will be controlled during fabrication to conform to calculations that show the reduced effects in combination with the spacing. Thermocouples will be fitted to the tile surfaces and at various depths in the gaps to measure temperatures during reentry.

The output of the thermocouples will be recorded on the orbiter's development flight instrumentation system. To assist in evaluation, Tile Gap Heating Effects data will be compared to development flight instrumentation data obtained from earlier missions.

This will be the fourth flight of the experiment which successfully flew on STS-2, 3 and 4. On STS-5 it will be modified to investigate the effect of tile gap geometry on gap filler bar heating. The STS-5 test configuration is co-sponsored by the Orbiter Experiments Project and the Orbiter Project.
Information provided by this test will aid the Orbiter Project in the evaluation of the filler bar heating phenomena.

Principal technologist is William C. Pitts, Ames Research Center, Mountain View, Calif.

Catalytic Surface Effects (CSE) Experiment

A strong shock wave will encompass the Shuttle orbiter during the atmospheric reentry maneuver. The shock wave severely compresses and heats the air flowing through it, causing the molecules to dissociate and react chemically with each other.

Computations show that as the dissociated atomic oxygen approaches the cooler regions of flow adjacent to the orbiter, the atomic oxygen fails to recombine into molecular oxygen.

This experiment will investigate the chemical reaction caused by impingement of atomic oxygen on the Shuttle thermal protection system which was designed on the assumption that the atomic oxygen would recombine at the thermal protection system wall.

This chemical reaction releases additional heat which results in higher thermal protection system temperatures. In this case, the surface is referred to as being a catalytic surface, that is, it allows the chemical reaction to take place.

If the thermal protection system surface is non-catalytic, the atomic oxygen will not recombine into molecular oxygen and the heating rates will be lowered. Thus, the temperature of the orbiter during reentry will be lower. With lower temperatures, orbiter thermal protection system weight could be reduced, its flight envelope could be expanded, or greater reusability could result.

The technology objective is to verify analytical predictions which could not be adequately simulated in ground-based facilities. The results will provide data and improved computational techniques for future thermal protection system designs.

The Catalytic Surface Effects will use baseline tiles, selected from those having development flight instrumentation thermocouples, located on or near the orbiter lower fuselage centerline. The seven tiles will be sprayed with an overcoating mixture of chrome-iron-spinel, a highly efficient catalytic material and a vinyl acetate binder which will protect the overcoat during ground operations. The mixture is compatible with the existing tile and coating and will not alter the thermal or mechanical properties of the uncoated portions of the thermal protection system. During orbiter ascent, the vinyl acetate will burn off the tile surface, leaving the chrome-iron-spinel exposed.

Thermocouple measurements recorded during reentry will be used to determine Catalytic Surface Effects performance. Comparison of this experiment's data with data taken on previous flights from uncoated tiles will aid in the performance evaluation.

This will be the fourth flight of the experiment. Data collected on the STS-2, 3 and 4 has been useful in verifying the preflight predictions that the tile surfaces are non-catalytic.

At the end of each mission, the overcoat will be removed from the seven tiles, leaving the thermal protection system in its original condition.

Principal technologist is David A. Stewart, Ames Research Center.

Dynamic, Acoustic and Thermal Environment (DATE) Experiment

To fully and economically exploit the benefits of the orbiter's large cargo-carrying capability, it is necessary to predict payload environments with accuracy and dispatch.

Such predictions will facilitate payload development and reduce the need for ultraconservative design and testing.

The Dynamic, Acoustic and Thermal Environment experiment will collect information for use in making credible predictions of cargo-bay environments. These environments are neither constant nor consistent throughout the bay and are influenced by interactions between cargo elements.

The instrumentation includes accelerometers, microphones, thermocouples and strain gages on payloads and in the cargo bay. Sensor outputs will be recorded for post-flight interpretation. DATE instrumentation has successfully flown on STS-1 through 4.

The Goddard Space Flight Center, Greenbelt, Md., will be responsible for the data reduction.

Principal technologist is William Bangs of Goddard.

Atmospheric Luminosities Investigation (Glow Experiment)

Nighttime photographs taken by the crew on STS-3 revealed an observable luminosity (glow) of unknown origin enveloping certain structural elements of the orbiter, particularly on the tail section and engine pods.

The luminosity was not symmetrical and appeared to be more prevalent on the port side of the vehicle. The best guess on the cause of this effect is recombination of ionospheric oxygen ions.

The purpose of the STS-5 investigation is to determine the spectral content of the Space Transportation System induced atmospheric luminosities which have relevance to scientific; (e.g., ion chemistry of the atmosphere) and engineering (e.g., potential contaminant to optical experiments) aspects of payload operations.

Two cameras, a Nikon 35mm and a Hasselblad, are used, one in each aft flight deck window. During two nighttime sequences, the crew activates the cameras four minutes after optical sunset (to assure no trace of sunlight) and after moonset and stops the film after 32 exposures or prior to sunrise. After flight, the photographs will be analyzed for possible causes of the luminosity effect.

E.L. Michel of Johnson is responsible for the investigation.

Oxygen Atom Interaction With Materials Test

Surfaces of materials used in the orbiter payload bay and exposed during STS-1 through STS-4 were examined after flight.

Paints and polymers, in particular Kapton used on the television camera thermal blanket, showed significant change. Generally, the change was a loss of surface gloss on the polymer with apparent aging on the paint surfaces.

The Kapton surfaces showed the greatest change, and postflight analyses showed mass loss of 4.8 percent on STS-2 and 35 percent on STS-3 for most heavily affected surfaces.

This materials test is being conducted on STS-5 to obtain quantitative reaction rates of low earth orbit oxygen atoms with various materials used on payloads. Data obtained on STS-2 through 4 indicate that some payloads may be severely limited in life due to oxygen effect. The STS-5 test would provide data for assessment of oxygen effects and possible fixes.

Test material is tensioned with hold down springs to six panels which will be mounted atop the Development Flight Instrumentation using existing power and switch capabilities. Materials will be returned for evaluation of space exposure effects.

The test material is located in the payload bay atop the Development Flight Instrumentation.

The responsible organization is the Johnson Space Center.

Development Flight Instrumentation

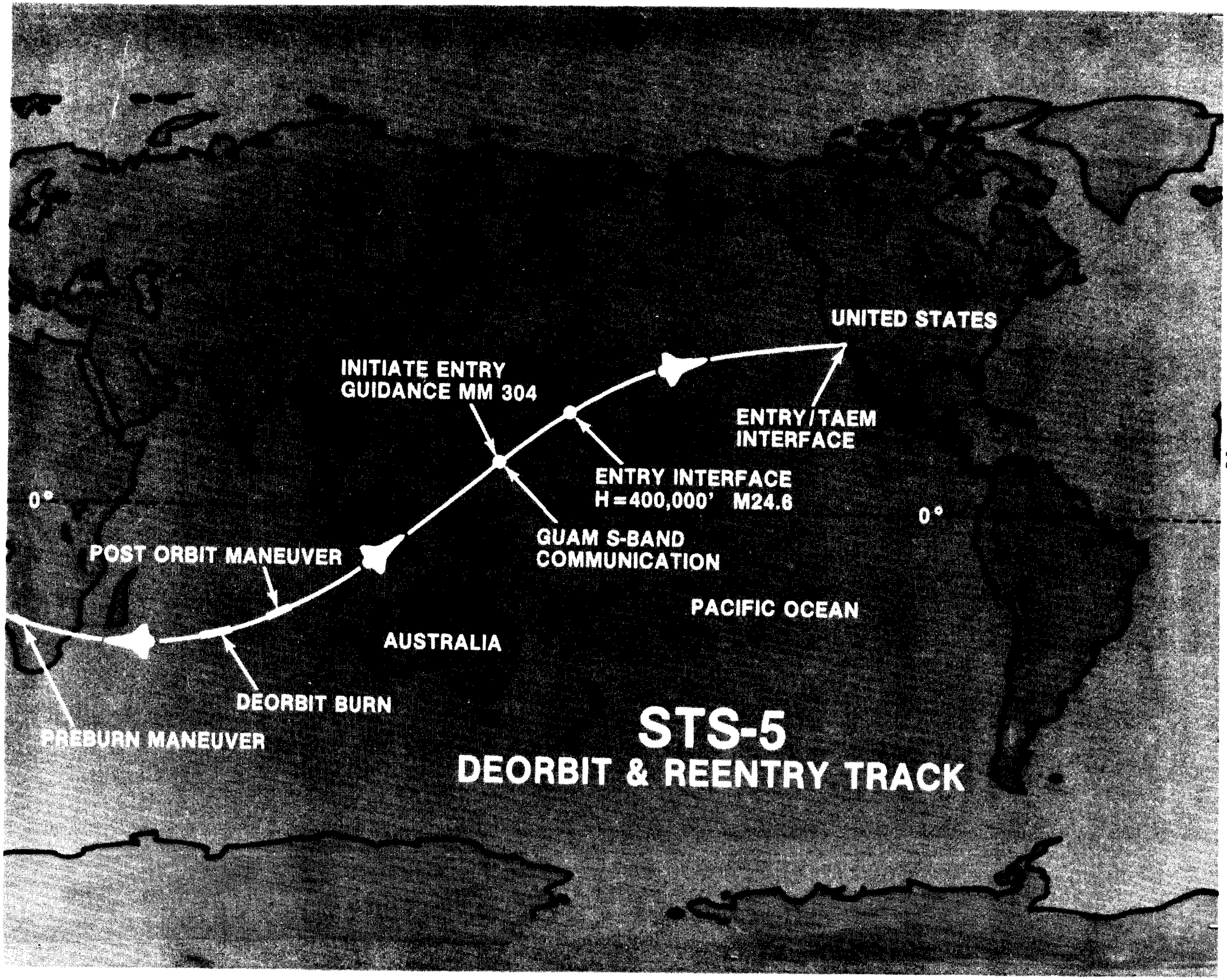
The Development Flight Instrumentation is a data collection and recording package, located in the aft areas of the payload bay, consisting of three magnetic tape recorders, wideband frequency division multiplexers, a pulse code modulation master unit and signal conditioners. The recorder can record 28 tracks of wideband analog data on systems conditions and performance simultaneously.

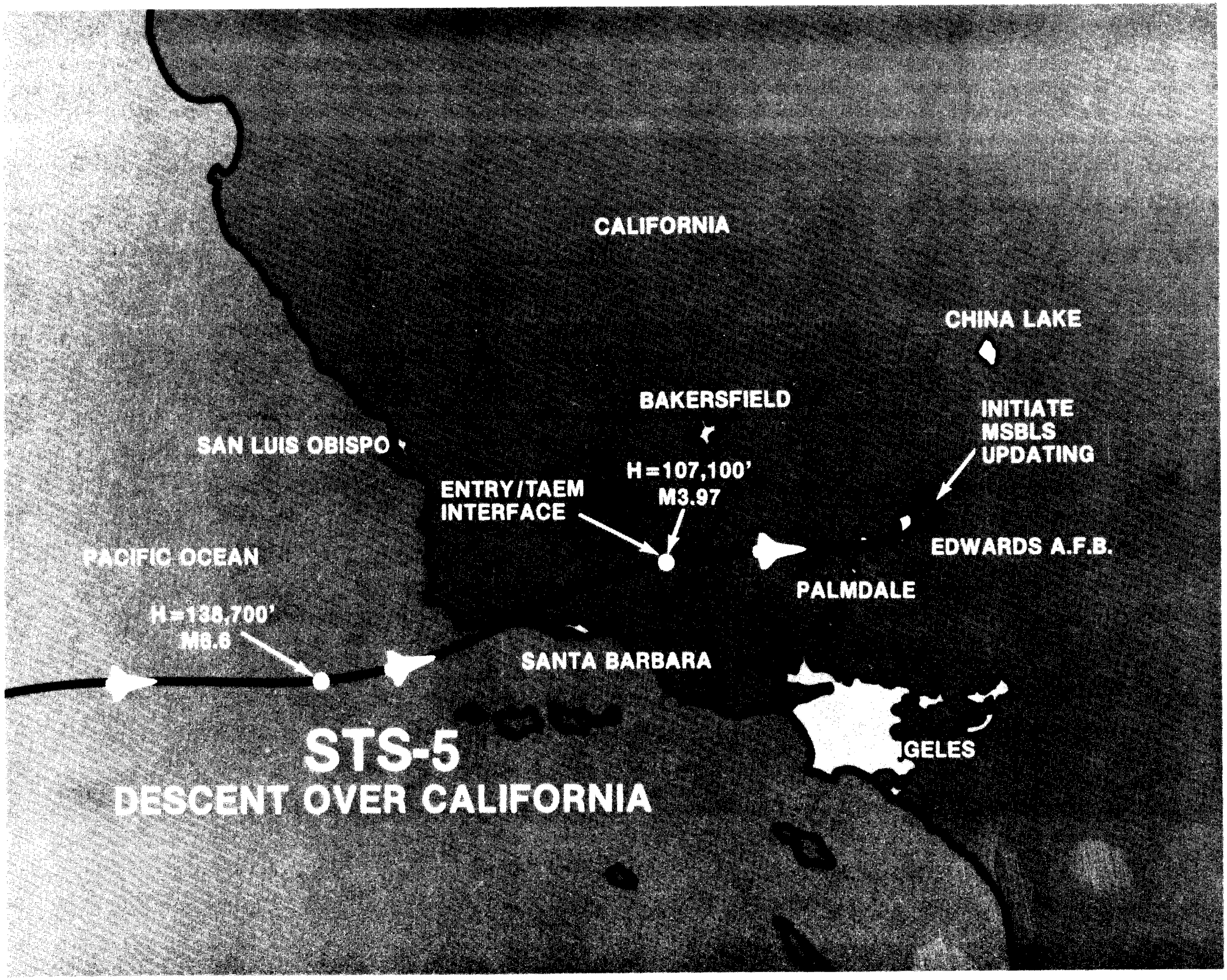
STS-5 LANDING OPPORTUNITIES FOR NASA DRYDEN

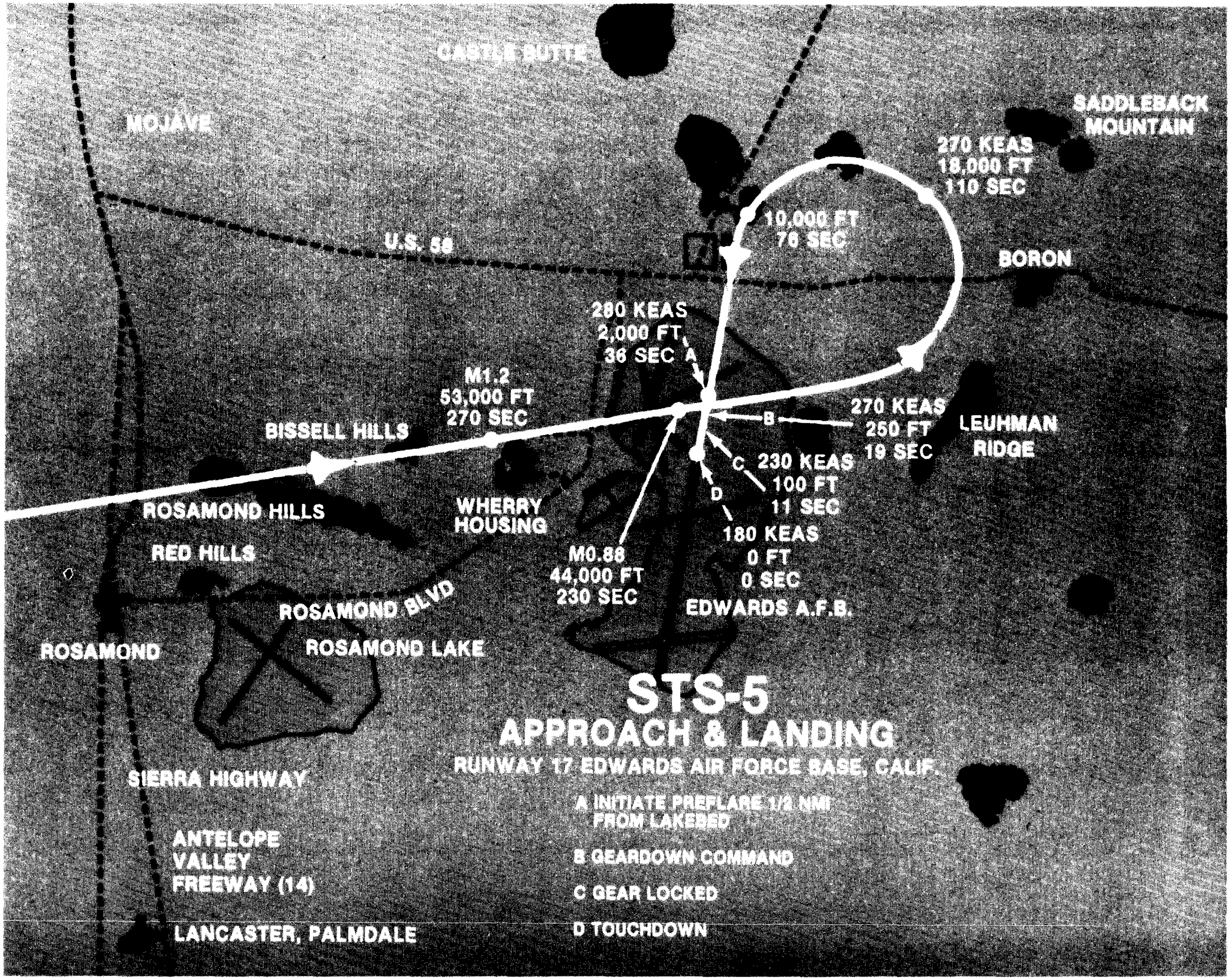
(Based on a 7:19 a.m. EST launch)

NOTE: Landing opportunities are in **Pacific Standard Time.**

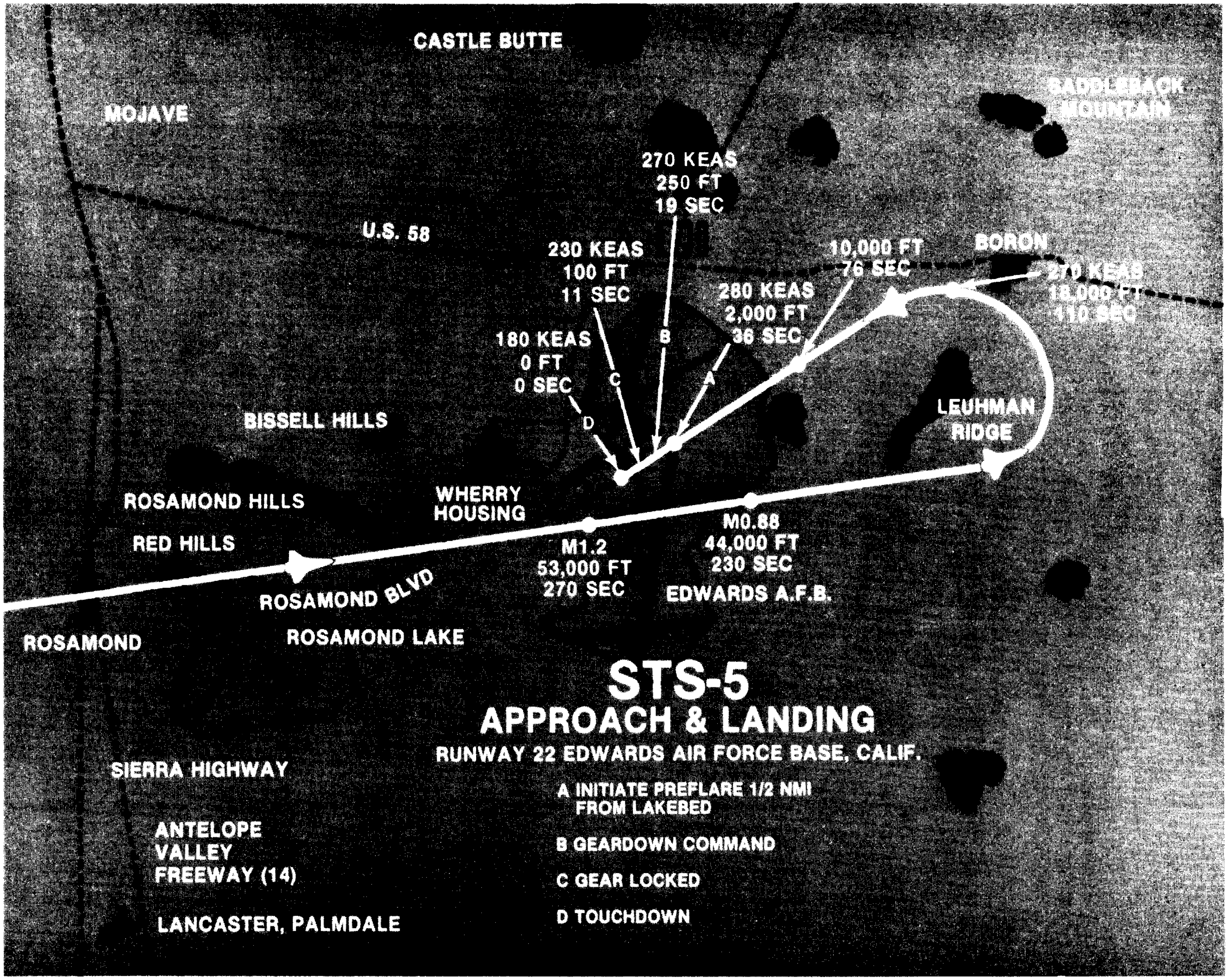
Orbit	Approximate Landing PST	Elapsed Time Days/Minutes	Cross Range (Nautical Miles)
1	6:05 a.m. (night)	0/148	460
2	7:70	0/321	398
3	9:16	0/457	578
16	4:39 a.m. (night)	1/020	593
17	6:14	1/155	402
18	7:49	1/330	451
19	9:24	1/505	734
31	3:12 a.m. (night)	1/2253	797
32	4:48 (night)	2/029	481
33	6:23	2/204	394
34	7:59	2/340	549
47	3:21 a.m. (night)	2/2302	631
48	4:56 (night)	3/037	413
49	6:31	3/212	432
50	8:06	3/347	686
63	3:20 a.m. (night)	3/2301	529
64	4:55 (night)	4/0036	390
65	6:30	4/211	491
66	8:04	4/345	815
78	1:43 a.m. (night)	4/2124	749
79	3:17 (night)	4/2258	458
80	4:25 (night)	5/0033	397
81 EOM	**6:27**	**5/208**	**573**
94	1:40 a.m (night)	5/2121	631
95	3:15 (night)	5/2256	412
96	4:49 (night)	6/030	429
97	6:23	6/204	677


UNITED STATES
INITIATE ENTRY
GUIDANCE MM 304
ENTRY/TAEM
INTERFACE
ENTRY INTERFACE
H=400,000' M24.6
0°
0°
GUAM S-BAND
COMMUNICATION
POST ORBIT MANEUVER
PACIFIC OCEAN
AUSTRALIA
DEORBIT BURN
PREBURN MANEUVER
STS-5
DEORBIT & REENTRY TRACK


CALIFORNIA
CHINA LAKE
BAKERSFIELD
INITIATE
MSBLS
UPDATING
SAN LUIS OBISPO
H=107,100'
M3.97
ENTRY/TAEM
INTERFACE
EDWARDS A.F.B.
PACIFIC OCEAN
PALMDALE
H=138,700'
M8.6
SANTA BARBARA
STS-5
DESCENT OVER CALIFORNIA



CASTLE BUTTE
MOJAVE
SADDLEBACK MOUNTAIN
270 KEAS
18,000 FT
110 SEC
10,000 FT
76 SEC
U.S. 58
BORON
280 KEAS
2,000 FT
36 SEC
A
M1.2
53,000 FT
270 SEC
B
270 KEAS
250 FT
19 SEC
LEUHMAN RIDGE
BISSELL HILLS
C
230 KEAS
100 FT
11 SEC
D
ROSAMOND HILLS
WHERRY HOUSING
180 KEAS
0 FT
0 SEC
RED HILLS
M0.88
44,000 FT
230 SEC
EDWARDS A.F.B.
ROSAMOND BLVD
ROSAMOND
ROSAMOND LAKE
STS-5
APPROACH & LANDING
RUNWAY 17 EDWARDS AIR FORCE BASE, CALIF.
SIERRA HIGHWAY
A INITIATE PREFLARE 1/2 NMI FROM LAKEBED
B GEARDOWN COMMAND
C GEAR LOCKED
D TOUCHDOWN
ANTELOPE VALLEY FREEWAY (14)
LANCASTER, PALMDALE


CASTLE BUTTE
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SADDLEBACK MOUNTAIN
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19 SEC
U.S. 58
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ROSAMOND LAKE
STS-5
APPROACH & LANDING
RUNWAY 22 EDWARDS AIR FORCE BASE, CALIF.
SIERRA HIGHWAY
A INITIATE PREFLARE 1/2 NMI FROM LAKEBED
ANTELOPE VALLEY FREEWAY (14)
B GEARDOWN COMMAND
C GEAR LOCKED
LANCASTER, PALMDALE
D TOUCHDOWN

LANDING AND POSTLANDING OPERATIONS

Kennedy Space Center is responsible for ground operations of the orbiter vehicle once it has rolled to a stop on the runway at Edwards, including preparations for returning the reusable vehicle to Kennedy Space Center for its next mission.

As soon as Columbia rolls to a stop, the recovery convoy will head toward the vehicle to begin preliminary securing and safing operations.

At the same time, the flight crew will turn off the auxiliary power units and turn on cooling systems and safe the orbiter's maneuvering and reaction control systems.

After SCAPE- (Self Contained Atmospheric Protection Ensemble) suited personnel have determined that hazardous vapor levels are below significant levels, the 100-member ground crew will perform such activities as connecting ground and purge air units, conducting a post-landing inspection and attaching the ground tow vehicle.

The mobile wind machine is used only if highly concentrated levels of explosive vapors are detected by the ground team.

Once the initial safety assessment is made, other teams of SCAPE-suited personnel and vehicles with maneuverable access platforms will then be positioned at the rear of the orbiter, near the vehicle's T-0 umbilical connection panels. The two large transporters, the Purge and Coolant Umbilical Access Vehicles, will then be moved into place behind the orbiter and their lines will be connected to the orbiter umbilical panels.

If everything is normal, and no explosive gases are detected, the Purge and Coolant Umbilical Access Vehicles will be moved into position. Freon lines and purge duct connections will be completed and the flow of coolant and purge air through the umbilical lines will provide cooling to the orbiter's systems. This cooling helps protect the orbiter's electronic equipment. Purge air will provide cool and humidified air conditioning to the orbiter's payload bay and other cavities to remove any residual explosive or toxic fumes and provide a safe, clean and cool environment inside the Columbia.

When further monitoring of vapor readings around the forward half of the orbiter indicates there are no concentrations of toxic gases, SCAPE-suited technicians working the forward section will be replaced by non-SCAPE personnel. The mobile white room will be moved into place around the orbiter crew access hatch. The hatch is opened and the flight crew is allowed to leave the crew cabin. The flight crew will be replaced by other astronauts who will complete the task of safing the vehicle.

The hatch on the side of the orbiter is scheduled to be opened within 30 minutes after landing. The crew will leave the orbiter at the direction of flight controllers at the Mission Control Center.

Columbia will be towed off the runway at Edwards to the Mate/Demate Device at the nearby Dryden Flight Research Facility.

Once in the Mate/Demate Device, Columbia's fuel cell supply tanks will be drained of residual cryogenic liquids, the Shuttle main engines will be purged and unfired pyrotechnic devices will be disconnected.

Ferry plugs will be installed in engine nozzles and locks put in place on the engines and flight control surfaces to keep them from moving during the ferry flight to Kennedy Space Center.

The aerodynamic tail cone will be installed over the aft end of the spacecraft and the orbiter will be positioned and bolted on top of the 747 Shuttle Carrier Aircraft.

The 747 is scheduled to leave California on the first leg of its two-day ferry flight to KSC five days after landing. An overnight stop is scheduled to refuel the 747 carrier aircraft and to rest the flight crew.

SPACEFLIGHT TRACKING AND DATA NETWORK (STDN)

One of the key elements in the Shuttle mission is the capability to track the spacecraft, communicate with the astronauts and to obtain the telemetry data that informs ground controllers of the condition of the spacecraft and its astronauts.

The hub of this network is at NASA's Goddard Space Flight Center, Greenbelt, Md., where the Spaceflight Tracking and Data Network (STDN) and the NASA Communications Network (NASCOM) is located.

With the exception of very brief periods during the launch, flight, and recovery of STS-5, Goddard receives all telemetry, radar and air-to-ground communications and relays the information to Johnson in Houston, and other NASA and Department of Defense facilities participating in the mission.

The Spaceflight Tracking and Data Network is a complex NASA worldwide system that provides real time communications with the Space Shuttle orbiter and crew. The network is operated by Goddard. Approximately 2,500 personnel are required to operate the network.

The network consists of 15 ground stations equipped with 4.3, 9, 12 and 26 m (14, 30, 40 and 85 ft.) S-band antenna systems and C-band radar systems, augmented by 15 Department of Defense geographical locations providing C-band support and one Department of Defense 18.3 m (60 ft.) S-band antenna system.

In addition, there are six major computing interfaces located at the Network Operations Control Center (NOCC) and at the Operations Support Computing Facility (OSCF), both at Goddard; Western Space and Missile Center, Calif.; Air Force Satellite Control Facility, Colo.; White Sands Missile Range, N.M.,; and Eastern Space and Missile Center, Fla., providing real time network computational support.

The network has agreements with the governments of Australia, Spain, Senegal, Botswana, Chile, United Kingdom and Bermuda to provide NASA tracking stations support to the Space Transportation System program.

Should the Johnson Mission Control Center be seriously impaired for an extended time, the Goddard Network Operations Control Center becomes an emergency mission control center manned by Johnson personnel, with the responsibility of safely returning the Space Shuttle orbiter to a landing site.

The Merritt Island, Fla., S-band station provides the appropriate data to the Launch Control Center at Kennedy and the Mission Control at Johnson during prelaunch testing and the terminal countdown. During the first minutes of launch and during the ascent phase, the Merritt Island and Ponce de Leon, Fla., S-band and Bermuda S-band stations, as well as the C-band stations located at Bermuda; Wallops Island, Va.; Grand Bahama; Grand Turk; Antigua; Cape Canaveral; and Patrick Air Force Base, Fla., provide appropriate tracking data, both high speed and low speed, to the Kennedy and Johnson Control Centers.

During the orbital phase, all the S-band and some of the C-band stations that see the Space Shuttle orbiter at 3 degrees above the horizon support and provide appropriate tracking, telemetry, air-ground and command support to the Johnson Mission Control Center through Goddard.

During the nominal reentry and landing phase planned for Edwards Air Force Base, Calif., the Goldstone and Buckhorn, Calif.; S-band stations and C-band stations at the Pacific Missile Test Center, Vandenberg Air Force Base, Edwards Air Force Base and Dryden Flight Research Facility will provide highly critical tracking, telemetry, command and air-ground support to the orbiter and send appropriate data to the Johnson and Kennedy Control Centers.

NASA TRACKING STATIONS

Location	Equipment
Ascension Island (ACN)	S-band, UHF A/G
Bermuda (BDA)	S-band, C-band, UHF A/G
Buckhorn (BUC)	S-band, C-band
Goldstone (GDS)	S-band, UHF A/G
Guam (GWM)	S-band, UHF A/G
Hawaii (HAW)	S-band, UHF A/G
Merritt Island (MIL)	S-band, UHF, A/G
Santiago (AGO)	S-band
Madrid (MAD)	S-band, UHF A/G
Orroral (ORR)	S-band
Botswana (BOT)	UHF A/G
Dakar (DKR)	UHF A/G
Yarragadee (YAR)	UHF A/G

Personnel:

Tracking Stations, 1,110*

Goddard Space Flight Center, 1,400

* More than 500 of whom are local residents.

HUNTSVILLE OPERATIONS SUPPORT CENTER

The Huntsville Operations Support Center is a facility at the Marshall Space Flight Center in Huntsville, Ala., which supports launch activities and powered flight at the Kennedy Space Center, Fla., and the Johnson Space Center, Houston.

During premission testing, countdown, launch and powered flight toward orbit, Marshall and contractor engineers and scientists man consoles in the support center to monitor real-time data being transmitted from the Shuttle. Their purpose is to evaluate and help solve problems that might occur with Marshall-developed Space Shuttle propulsion system elements, including the Shuttle Main engines, external tank, and solid rocket boosters. They will also work problems with the overall main propulsion system and the range safety system.

The data providing information on the "health" of these systems are gathered by sensors aboard the Shuttle and are instantaneously transmitted from the launch site to the Huntsville Operations Support Center. There the information is processed by computers and displayed on screens and other instruments at 12 stations in the Engineering Console Room on the second floor. More than 3,000 temperature, pressure, electrical voltage and other measurements are made every second. During the 10 hours of peak activity before and during launch, more than 11 million measurements are assessed by teams of experts in the support center.

Support center personnel view the Shuttle via two closed circuit television lines. They also have access to more than 25 direct communications lines that link them with the launch site at Kennedy, Mission Control at Johnson and with Shuttle propulsion system contractor plants.

If a problem is detected by the experts at one of the stations in the support center console room, engineers on the consoles immediately alert appropriate individuals at the Kennedy and Johnson Centers, and operations center managers in the Shuttle action center, a conference room adjacent to the console room. They also pass the information to the appropriate teams of specialists in the operations center working area nearby. There are separate teams to work difficulties for each of the elements.

CREW BIOGRAPHIES

NAME: Vance DeVoe Brand, STS-5 Commander
NASA Astronaut

BIRTHPLACE AND DATE: Born in Longmont, Colo., May 9, 1931. His parents, Dr. and Mrs. Rudolph W. Brand, reside in Longmont.

PHYSICAL DESCRIPTION: Blond hair; gray eyes; height: 5 feet 11 inches; weight: 175 pounds.

EDUCATION: Graduated from Longmont High School, Colo.; received a bachelor of science degree in business from the University of Colorado in 1953, a bachelor of science degree in aeronautical engineering from the University of Colorado in 1960, and a master's degree in business administration from the University of California at Los Angeles in 1964.

MARITAL STATUS: Married to the former Beverly Ann Whitnel. Her parents, Mr. and Mrs. Otis W. Whitnel, reside in Houston.

CHILDREN: Susan N., April 30, 1954; Stephanie, Aug. 6, 1955; Patrick R., March 22, 1958; Kevin S., Dec. 1, 1963, and Erik R., May 11, 1981.

NASA EXPERIENCE: One of the 19 pilot astronauts selected by NASA in April 1966, Brand first served as a crew member of the thermal vacuum chamber testing of the prototype command module and was a support crewman for the Apollo 8 and 13 missions. Later he was backup command module pilot for Apollo 15 and backup commander for the Skylab 3 and 4 missions.

Vance Brand made his first space flight on July 15, 1975, as Apollo command module pilot on the Apollo-Soyuz Test Project (ASTP) mission. This joint space flight resulted in the first historic meeting in space between American astronauts and Soviet cosmonauts. Other crewmen taking part in this nine-day earth-orbital mission were Thomas P. Stafford, Apollo commander; Donald K. Slayton, Apollo docking module pilot; Cosmonaut Alexey Leonov, Soyuz commander; and Cosmonaut Valeriy Kubasov, Soyuz flight engineer.

The Soyuz spacecraft was launched at the Baikonur Cosmodrome in Central Asia, and the Apollo was launched 7-1/2 hours later at Cape Canaveral. Two days later the Apollo soacecraft accomplished a successful rendezvous and docking with Soyuz. The linkup tested a unique, new docking system and paved the way for future international cooperation in space. Twenty-eight experiments were performed during the flight.

There were 44 hours of docked joint activities which included four crew transfers between the Apollo and the Soyuz. All major ASTP objectives were accomplished, and experience was gained in the conduct of complex, international manned missions. Six records for docked and group flight were set on the mission and are recognized by the Federation Aeronautique Internationale. Apollo splashed down in the Pacific Ocean near Hawaii, less than a mile from the targeted splash point, and was promptly recovered by the USS NEW ORLEANS. Brand logged 217 hours on his first space flight.

# # #

NAME: Robert F. Overmyer, Colonel, USMC, STS-5 Pilot
NASA Astronaut

BIRTHPLACE AND DATE: Born July 14, 1936, in Lorain, Ohio, but considers Westlake, Ohio his hometown.

PHYSICAL DESCRIPTION: Brown hair; blue eyes; height: 5 feet, 11-3/4 inches; weight: 180 pounds.

EDUCATION: Graduated from Westlake High School, Ohio, in 1954; received a bachelor of science degree in physics from Baldwin-Wallace College in 1958; master of science degree in aeronautics with a major in aeronautical engineering from the U. S. Naval Postgraduate School in 1964.

MARITAL STATUS: Married to the former Katherine E. Jones of Pittsburgh. Her parents, Mr. and Mrs. Henry R. Jones, now reside in Highland Beach, Fla.

CHILDREN: Carolyn Marie, 1966; Patricia Ann, 1968; Robert Rolandus, 1970.

NASA EXPERIENCE: He was selected as a NASA astronaut in 1969 after the U.S. Air Force Manned Orbiting Laboratory Program was cancelled. His first assignment with NASA was engineering development duties on the Skylab Program from 1969 until November 1971. From November 1971 until December 1972, he was a support crew member for Apollo 17 and was the launch capsule communicator. From January 1973 until July 1975, he was a support crew member for the Apollo-Soyuz Test Project and was NASA capsule communicator in the mission control center in Moscow. In 1976, he was assigned duties on the Space Shuttle Approach and Landing Test (ALT) Program and was the prime T-38 chase pilot for orbiter Free-Flights 1 and 3.

# # #

NAME: Joseph P. Allen, PhD, STS-5 Mission Specialist
NASA Astronaut

BIRTHPLACE AND DATE: Born in Crawfordsville, Ind., on June 27, 1937. His parents, Mr. and Mrs. Joseph P. Allen III, reside in Greencastle, Ind.

PHYSICAL DESCRIPTION: Brown hair; blue eyes; height: 5 feet 6 inches; weight: 125 pounds.

EDUCATION: Attended Mills School and is a graduate of Crawfordsville High School in Indiana; received a bachelor of arts degree in math-physics from DePauw University in 1959; a master of science degree and a doctorate in physics from Yale University in 1961 and 1965, respectively.

MARITAL STATUS: Married to the former Bonnie Jo Darling of Elkhart, Ind. Her parents, Mr. and Mrs. W. C. Darling, reside in Elkhart.

CHILDREN: David Christopher, September 1968; Elizabeth Darling, May 1972.

NASA EXPERIENCE: Allen was selected as a scientist-astronaut by NASA in August 1967. He completed flight training at Vance Air Force Base, Okla. He served as mission scientist while a member of the astronaut support crew for Apollo 15 and served also as a staff consultant on science and technology to the President's Council on International Economic Policy.

From August 1975 to 1978, Allen served as NASA Assistant Administrator for Legislative Affairs in Washington, D.C. Returning to the Johnson Space Center in 1978 as a senior scientist astronaut, Allen was assigned to the operations mission development group. He served as a support crew member for the first orbital flight test of the Space Shuttle transportation system, and was the entry CAPCOM for this mission. In addition, in 1980 and 1981, he worked as the technical assistant to the Director of Flight Operations.

# # #

NAME: William B. Lenoir, PhD, STS-5 Mission Specialist
NASA Astronaut

BIRTHPLACE AND DATE: Born on March 14, 1939, in Miami, Fla. His father, Samuel S. Lenoir, resides in Miami.

PHYSICAL DESCRIPTION: Brown hair; brown eyes; height: 5 feet 10 inches; weight: 150 pounds.

EDUCATION: Attended primary and secondary schools in Coral Gables, Fla.; a graduate of the Massachusetts Institute of Technology where he received a bachelor of science degree in electrical engineering in 1961, a master of science in 1962, and a doctorate in 1965.

MARITAL STATUS: Married to the former Elizabeth May Frost. Her mother, Mrs. Thomas F. Frost, resides in Brookline, Mass.

CHILDREN: William B., Jr., April 6, 1965; Samantha E., March 20, 1968.

NASA EXPERIENCE: Lenoir was selected as a scientist-astronaut by NASA in August 1967. He completed the initial academic training and a 53-week course in flight training at Laughlin Air Force Base, Texas.

Lenoir was backup science-pilot for Skylab 3 and Skylab 4, the second and third manned missions in the Skylab Program. During Skylab 4, he was co-leader of the visual observations project and coordinator between the flight crew and the principal investigators for Apollo telescope mount solar science matters.

From September 1974 to July 1976, Lenoir spent approximately half of his time as leader of the NASA Satellite Power Team. This team was formed to investigate the potential of large-scale satellite power systems for terrestrial utility consumption and to make program recommendations to NASA Headquarters.

Lenoir has supported the Space Shuttle program in the areas of payload deployment and retrieval. His interest in the remote sensing of the earth and its resources continues, with particular emphasis on the role of man.

# # #

SPACE SHUTTLE PROGRAM MANAGEMENT

NASA Headquarters

James M. Beggs	Administrator
Dr. Hans Mark	Deputy Administrator
Lt.Gen. James A. Abrahamson	Associate Administrator for Space Flight
L. Michael Weeks	Deputy Associate Administrator for Space Flight
Joe H. Engle	Assistant Associate Administrator for Space Flight (Space Transportation)
Isaac T. Gilliam IV	Assistant Associate Administrator for Space Flight (Policy)
Richard J. Wisniewski	Assistant Associate Administrator for Space Flight (Institutions)
Robert E. Smylie	Associate Administrator for Space Tracking and Data Systems

Ames Research Center

C. A. Syvertson	Director

Dryden Flight Research Facility

John Manke	Facility Manager
Gary Layton	Shuttle Project Manager

Goddard Space Flight Center

Dr. Noel W. Hinners	Director
John J. Quann	Deputy Director
Richard S. Sade	Director of Networks Space Tracking and Data Network (STDN)

Johnson Space Center

Gerald D. Griffin	Director
Henry E. Clements	Associate Director
Clifford E. Charlesworth	Deputy Director
Glynn S. Lunney	Manager, Space Shuttle Program
Arnold D. Aldrich	Manager, Space Shuttle Orbiter Project Office
George W.S. Abbey	Director of Flight Operations
Aaron Cohen	Director of Engineering and Development
Lynwood C. Dunseith	Director of Data Systems and Analysis

Kennedy Space Center

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George F. Page	Deputy Director
Robert H. Gray	Manager, Shuttle Projects Office
John J. Neilon	Manager, Cargo Projects Office
Thomas E. Utsman	Director, Shuttle Operations/ Technical Support
Thomas S. Walton	Director, Cargo Operations
Alfred D. O'Hara	Director, STS Processing

Marshall Space Flight Center

Dr. William R. Lucas	Director
Thomas J. Lee	Deputy Director
Robert E. Lindstrom	Manager, MSFC Shuttle Projects Office
James E. Kingsbury	Director, Science and Engineering Directorate

James B. Odom	Deputy Manager for Production and Logistics, MSFC Shuttle Projects Office and Acting Manager, External Tank Project
George B. Hardy	Deputy Manager for Development, MSFC Shuttle Projects Office
Lawrence B. Mulloy	Manager, Solid Rocket Booster Project, MSFC Shuttle Projects Office
Lowell K. Zoller	Manager, Engineering and Major Test Management Office, MSFC Shuttle Projects Office
Judson A. Lovingood	Manager, Space Shuttle Main Engine Project, MSFC Shuttle Projects Office

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